

MAY 1981 \$1.50

MECHANICAL ILLUSTRATED

HOW-TO · ENERGY · AUTOMOTIVE

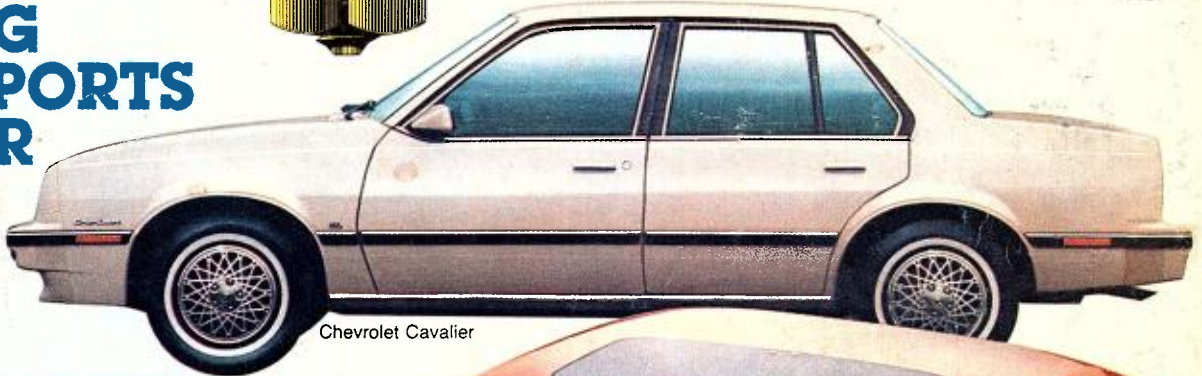
Build Yourself
a Sunspace
On a Raised Deck

06328

**BEATING
THE IMPORTS
AT THEIR
OWN
GAME—**

**GM's
FRONT-DRIVE
FUEL-EFFICIENT
J-CAR**

**OVER 35 PAGES
ON HOW TO SERVICE
NEW FRONT-DRIVE
CARS, PLUS...**



Chevrolet Cavalier

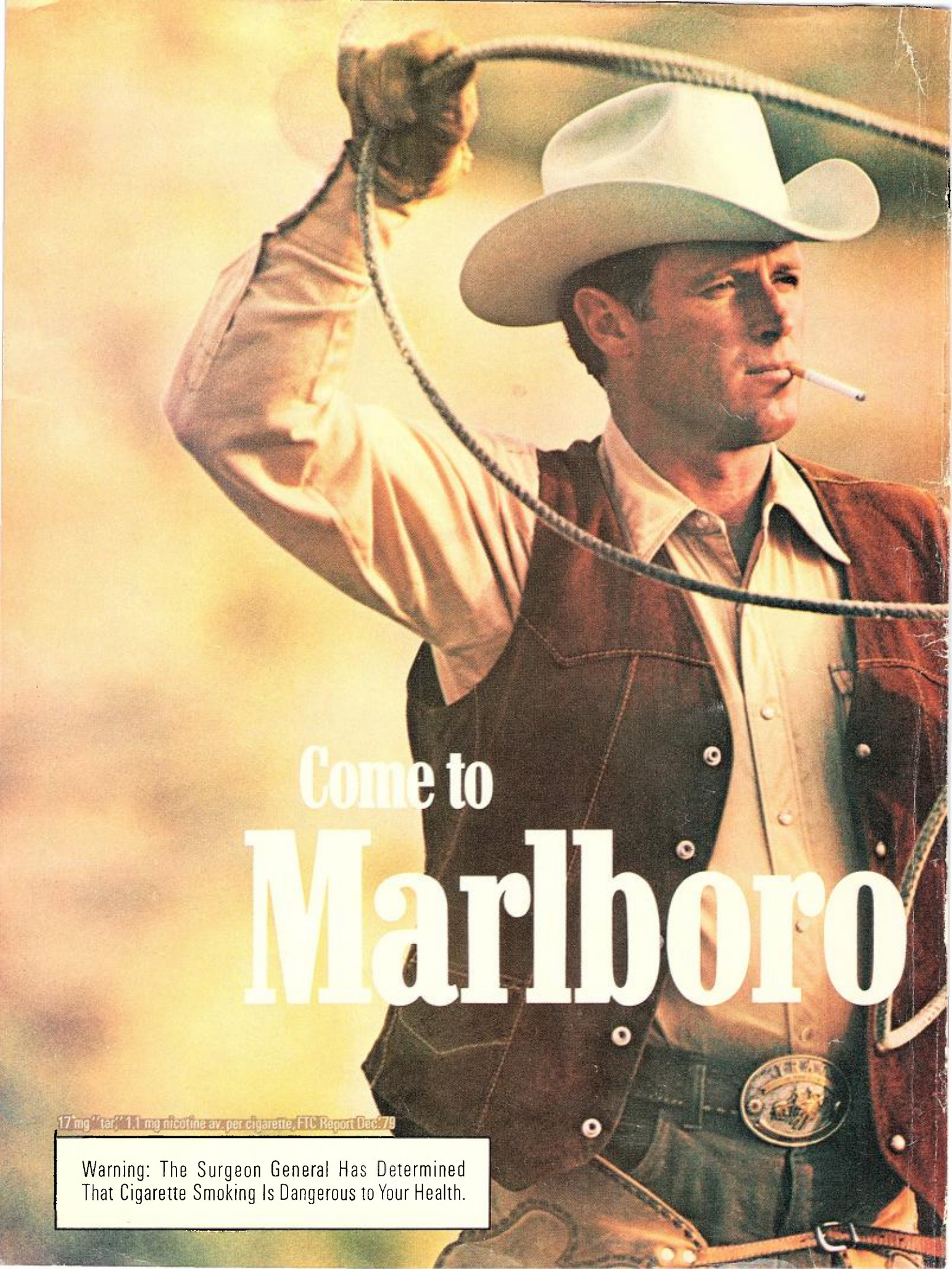


**...DON
CHAIKIN
DRIVES
THIS NEW
PONTIAC
J2000**

**HIS REPORT
STARTS ON
PAGE 70**



562283 BAC 00184097 0423 MAR82
DENNIS BLACK
18 MULBERRY LN
EDISON NJ 08817

A full-page advertisement for Marlboro featuring a cowboy. The cowboy is a man with a serious expression, wearing a white cowboy hat, a light-colored long-sleeved shirt, a dark brown leather vest, and a large silver belt buckle. He is holding a lasso in his right hand, which is raised high. A cigarette is in his mouth. The background is a warm, golden-yellow color with a subtle texture.

Come to Marlboro

17 mg "tar," 1.1 mg nicotine av. per cigarette, FTC Report Dec. 79

Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

Country.



Marlboro Red or Longhorn 100's—
you get a lot to like.



On Our Cover: It looks like transverse-engine, front-drive cars are the engineering phenomenon of the decade, reports Automotive Editor Don Chaikin. Our cover depicts two J-Cars—Pontiac's J2000 in the foreground and Chevrolet's Cavalier behind it. The common denominator between the two is the J, which stands for the basic engineering concept. The distinguishing features result from the fact that the two cars are produced by different GM divisions. Our special section this month, *Front Drive for the '80s*, features both driving and technical reports on the J-Car along with car-by-car service comparisons of all domestic transverse-engine front-drives and those of the major import competition.

HOW-TO

- 50 Sorting Out Specialized Drills & Bits
- 60 MI Workshop Heirloom: A Classic Corner Cupboard
- 64 Build a Sunspace on a Raised Deck



Oak corner cupboard for storage and display makes good use of an otherwise wasted space and can be built in two or three weekends. P. 60.

ENERGY/SCIENCE

- 47 The Impending Solar Suburbs
- 54 Coal Power's Deadly Fallout



Solar energy systems are becoming standard with some housing developments. The result might become commonly known as solar suburbs. P. 47.

AUTOMOTIVE

SPECIAL SECTION: FRONT DRIVE FOR THE '80s

- 69 Introduction
- 70 GM's J-Car: Finally, a Real Import-Beater
- 76 New Engineering for the J-Car
How to Service:
- 86 GM's J-Car
- 88 GM's X-Car
- 90 Escort/Lynx
- 92 Omni/Horizon
- 94 Chrysler's K-car
- 96 Rabbit
- 98 Honda
- 102 Mazda



Transverse-engine front-drives will dominate this decade, despite the fact that they are difficult to service. See our special section, p. 69.

DEPARTMENTS AND OTHER FEATURES

- 6 In MI Opinion
- 8 Missives
- 14 Home & Shop: A Bonanza of Building Materials
- 20 Car Care: Servicing the Old Bomb
- 30 Roughing It: Getting Wood Cheap
- 34 The Energy Line
- 36 Auto ABCs: Replacing Burned-Out Bulbs
- 42 Book Rack
- 44 The World of Science
- 56 What's New in Major Appliances for 1981
- 62 Six Steps to Rejuvenating Your Lawn
- 135 Golden Hammer
- 148 Nuts!



Rejuvenating your lawn is easy if you follow the six steps in our report. And it's a good way to shake off those winter doldrums, too. P. 62.

COMING NEXT MONTH

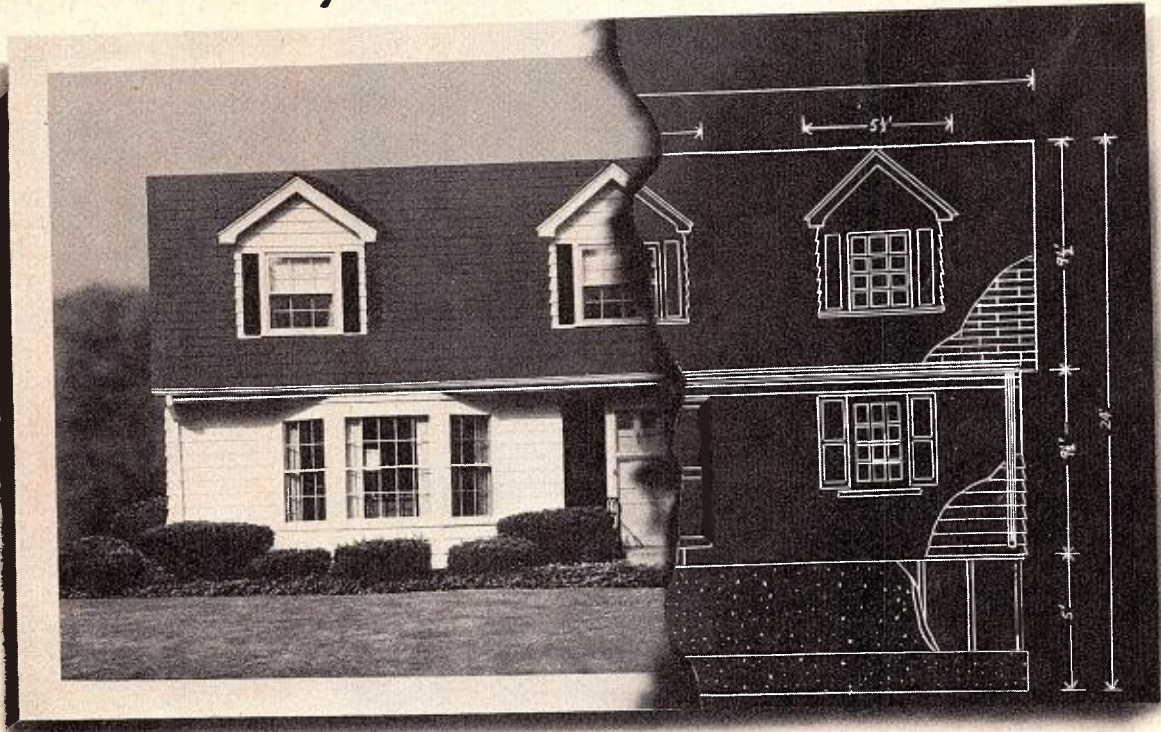
A special section on 3 Great Woodworking Crafts You Can Do. Our article on "Fancy Fretwork," a woodworking technique handed down from Victorian master carpenters, features projects ranging from a simple shade pull to intricate door panels and mirror frames. And there's

another intricate woodworking project, "Wood Mechanism," that uses radial-arm, jig and table saws.

Also in this issue, to keep you current with your neighbors, we tell you how to assemble and install a hot tub. (This one features a solar collector to heat it.) Plus a driving report on the Dodge Aries K.

Today 9 out of 10 homeowners
have no guarantee
their insurance will pay to
fully rebuild their homes.

Are you one of them?



Ask about Allstate's brand-new Home Replacement Guarantee.

Today's building costs are going up constantly. In many cases, even faster than inflation. And until now, there's been almost no way to be sure your homeowner's insurance coverage would keep up. Even automatic inflation protection is no guarantee your home can be totally rebuilt.

Today there *is* a way to be sure. If your home is destroyed by fire or other insured hazards, Allstate's new Home Replacement Guarantee* can pay to rebuild it *just like it was*—no matter how high building costs

rise. Even if it costs more than you're covered for! *Guaranteed in writing.*

Ask an Allstate agent how you can get Allstate's new Home Replacement Guarantee.

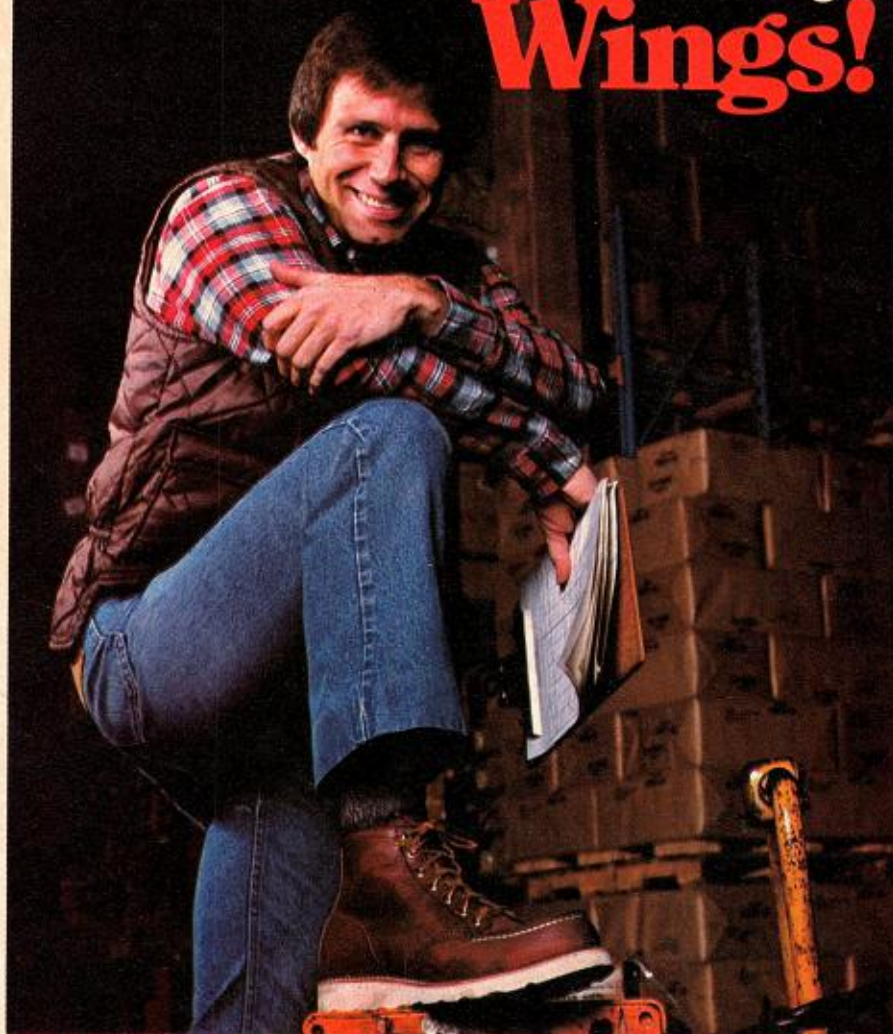
For ideas that make good sense today, you're in good hands with Allstate.

See Allstate for a free home value analysis.

Allstate®
You're in good hands.

*Optional in most states on Allstate Insurance Company's Standard and Deluxe Homeowner's policies. Allstate Insurance Company, Northbrook, Illinois 60062

I've earned my Wings!



Red Wings RED WING SHOES

...for wear on concrete.

"This concrete floor was cold and hard—till I started wearing my Red Wings. These cushion soles make cement feel like carpet. And the wedge shape gives support from heel to toe. So when I leave work, my feet still feel good. For wear on concrete, nothing else compares.

And I've earned my Wings!"

For feet that have earned the best.

© 1980 Red Wing Shoe Co., Red Wing, MN 55066



*Cushion crepe wedge sole
Red Wings: Men's size range
5-16, widths AAA-EEEE.*
Women's (not shown)
size range 5-10, widths AA-D.*
Look in the Yellow Pages
under "Shoes."*

**Size and width
availability
varies with style.*

MAY 1981



MECHANIX ILLUSTRATED

Publisher Michael J. O'Neill

Editor David E. Petzal

Managing Editor Paul M. Eckstein

Art Director Andrew Steigmeier

Senior Editor Nancy Cooper

Home & Shop Editor Burt Murphy

Assoc. Home & Shop Ed. Elizabeth Jager

Automotive Editor Don Chaikin

Science Editor Charles A. Miller

Associate Editor Slaton L. White

Assistant Editor Beverly A. Benn

Assistant Editor Tricia Mulvihill

Reader Mail Corresp. Natalie Posner

Electronics Editor Robert D. Freed

European Editor Gordon Wilkins

Associate Art Director Mindy Kombert

Advertising Director Joseph Kelly, Jr.

Eastern Manager Edwin T. Knobloch

Midwestern Manager Larry Craven

Detroit Manager William G. Buchanan

West Coast Manager Carroll J. Loos

Southern Reps Miller & Tillman

Mail Order Manager David Phillips

Classified Manager Linda Pedro

General Manager John I. Condon

Marketing Services Dir. Arnold Gluskin

Cir. Mkg. Dir. George W. Wincheste III

Subscription Director Martin Goodman

Business Manager Thomas Hershkowitz

Production Director Gerald Palacios

Production Manager Laurel Kurnides

MECHANIX ILLUSTRATED (ISSN 0025-6587) combined with ELECTRONICS ILLUSTRATED is published monthly by CBS Publications, the Consumer Publishing Division of CBS Inc., 1515 Broadway, New York, N.Y. 10036. Robert J. Krefting, President; George H. Allen, Sr. Vice President/magazines, Michael O'Neill, Vice President and Group Publisher.

ADDRESS ALL MAIL: Subscriptions, to Subscription Dept., P.O. Box 2830, Boulder, Colo. 80322 and all editorial and advertising to CBS Publications, 1515 Broadway, New York, N.Y. 10036.

EDITORIAL OFFICES: 1515 Broadway, N.Y., N.Y. 10036.

ADVERTISING OFFICES: 1515 Broadway, N.Y., N.Y. 10036; 303 East Ohio Street, Chicago, Ill. 60611; 100 Renaissance Center, Suite 1465, Detroit, Michigan 48243; 3807 Wilshire Blvd., Los Angeles, Calif. 90010; Miller & Tillman, Inc., 4651 Roswell Road N.E., Suite 201C, Atlanta, Ga. 30342. Printed in U.S.A. © 1981 CBS Publications, the Consumer Publishing Division of CBS Inc. All rights reserved. MECHANIX ILLUSTRATED and ELECTRONICS ILLUSTRATED are registered trademarks of CBS Inc.

Reprinting in whole or in part forbidden except by permission of the publishers. Address manuscripts to N.Y. editorial offices. Unacceptable contributions will be returned if accompanied by sufficient first class postage. Not responsible for lost manuscripts or photos. Microfilm copies of current and back issues are available from University Microfilms, 313 N. First St., Ann Arbor, Mich. 48103.

SUBSCRIPTION PRICE: In U.S. and possessions, \$9.94 for one year. Add \$2 per year for Canada and \$5 per year for all other countries. Foreign subscriptions and sales should be remitted by International Money Order in U.S. funds.

Controlled Circulation postage paid at New York, NY 10001 and at additional mailing offices.

Moving? Please send notice of address change (enclosing latest address label) 6 weeks in advance to MECHANIX ILLUSTRATED, P.O. Box 2827, Boulder, Colo. 80302.

POSTMASTER: Please send notices by Form 3579 to Mechanix Illustrated, P.O. Box 2827, Boulder, Colo. 80302.



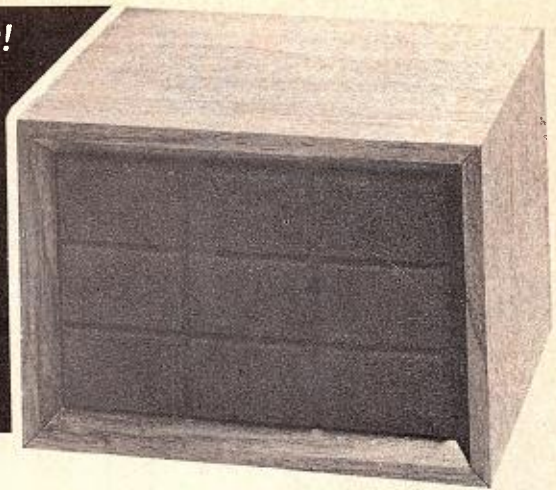
Not Just Another Limited Area Motion Detector!

guardex™

Protects Every Square Inch Of Your Building

Turns On Lights Automatically

Powerful Electronic Siren



The Guardex 8000 Alarm System is walnut grained and disguised to look like a small stereo speaker (6 3/4" x 9 3/4" x 8") and weighs less than 6 1/2 pounds.

Low Cost Computerized Burglar Alarm System Home - Office - Business

NO INSTALLATION

Just plug the Guardex 8000 alarm system in, make two simple control adjustments to suit your particular building and it works! There are no other wires to run. This totally self-contained burglar alarm can completely seal off every square inch of the surface of your building. It protects doors, windows, and what most alarms miss... your roof, walls and floors.

HOW CAN ONE SMALL COMPUTER PROTECT MY WHOLE BUILDING?

Guardex 8000 Alarm System works on the principle of audio discrimination. This, put simply, is the process of electronically separating normal everyday sounds, such as voices, telephones, etc. from break-in type noises such as breaking glass, prying metal, or forcing a door open. The Guardex 8000 protects one story homes and offices up to 2000 square feet and open commercial buildings up to 10,000 square feet. The Guardex 9300 with wireless remote sensor capability is available for multi-story homes and offices or single story with more than 2000 square feet. Call the factory for more detailed information.

TURNS ON LIGHTS AUTOMATICALLY

When the first break-in type sound is detected, the system will instantly turn on lights, radio, or other electronic equipment that you have plugged into the back of the alarm. These lights or other equipment will remain on for a period of five minutes, then automatically turn off.

POWERFUL ELECTRONIC SIREN

The Guardex 8000 alarm is equipped with a loud built-in siren. If during the five minute period the lights or other electronic equipment has been activated, a second break-in sound is detected, (it can be only a second or two after the first break-in sound) the built-in siren will start blasting for 90 seconds. At the end of approximately 90 seconds the siren will shut off and the alarm listens again. If another break-in sound is heard, the siren will come on for another 90 seconds. If no other break-in sound is detected, the siren will stay off and at the end of the five minute period the lights will shut off and the alarm instantly resets.



The rear control panel contains two standard AC plug receptacles for a table lamp, spot lights, radio, etc.; terminals for connecting optional outside siren and back-up battery (not included); entry delay time control and sensitivity control.

EXIT AND ENTRY DELAY

The Guardex 8000 alarm has a built-in exit delay allowing you approximately one minute to lock up and leave the building before the alarm is armed. When you enter your building you may find that just your normal entering sounds activate the siren. You may delay it from starting for up to 30 seconds by turning up the siren entry delay control.

BATTERY BACK-UP

Burglars rarely cut power. However, to give you total protection from a burglar and possible power failure, our alarm has provisions for a battery back-up. (Batteries not included). 12 volt lantern batteries are available at most hardware stores.

THE BURGLARY PROBLEM

The F.B.I. statistics show that at the present rate, one out of every four Americans are going to be burglarized. That is not a very pleasant fact, but it is true. You have a greater chance of being burglarized than being a victim of a fire or automobile accident. The time is now to help protect yourself and your valuables with a Guardex 8000 alarm system.

OUTSIDE SIREN

The Guardex 8000 alarm is equipped with a loud, built-in siren, but if you desire an additional siren to mount outside or in an area away from the main alarm, they are available with 50 feet of wire for \$24.95. (Connecting terminals are provided on the back of the alarm).

30 DAY NO RISK TRIAL

This is your opportunity to purchase an alarm system directly from the factory for only **\$199.95**. Try it in your home or business for thirty days without risking one cent. Put our Guardex 8000 alarm to your own test. See for yourself! It will protect every window and door from break-in. If you are not completely satisfied, return the alarm within 30 days for a complete refund. To order your Guardex 8000 alarm, **CALL TOLL FREE** to charge your credit card or send your check to Guardian Electronics, Inc. in the amount of \$199.95 plus \$3.50 postage and handling. If you want the optional outside siren, add \$24.95 (California residents add 6% sales tax.)

(If you require more information, call during California business hours, Monday - Friday).

Dealer Inquiries Invited



CALL TOLL FREE
(800) 423-5499

California residents:
(213) 889-1414 collect.

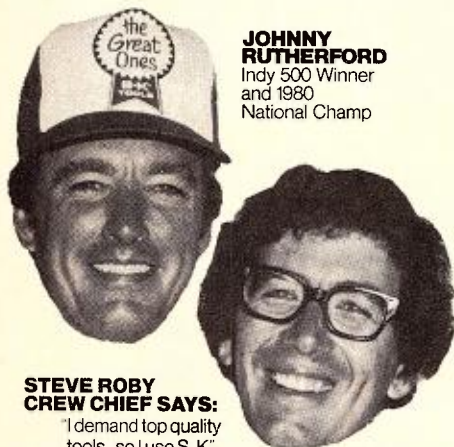
**GUARDIAN
ELECTRONICS, INC.**

Price subject
to change
without notice.

31117 Via Colinas, Dept. E

Westlake Village, Calif. 91361

S-K Tools Indy SPECIALS



JOHNNY RUTHERFORD
Indy 500 Winner
and 1980
National Champ

STEVE ROBY
CREW CHIEF SAYS:
"I demand top quality
tools, so I use S-K."



USER SAVES \$45.67 - OVER 54%

21 pc. 1/4" dr. 6 pt. Socket Set • Famous S-K Reversing Action Ratchet • Multi-Tooth Contact Feature Provides Smooth Tight Arc Action • Diamond Knurled Handle For Sure Grip and Comfort • Special Alloy Steel, Heat Treated, Oil Quenched and Tempered For Long Life • Special Extra Quality Finish-Nickel Chrome Plated.

YOUR CHOICE

\$39.99



USER SAVES \$26.00 - OVER 40%
11 pc. Metric Combo Wrench Set • Free Magna Drive With 4 Bits • All S-K Combination Wrenches Are Special Steel Drop Forged For Total Strength • Heat Treated Oil Quenched And Tempered Assuring Iron Hardness • Broached Polished And Nickel Chrome Plated

USER SAVES \$37.81 - Over 40%
20 pc. 1/4" dr. 6 pt. Socket Set • S-K Cold Extruded Sockets Mean More Strength, Durability and Thinner Walls • A Great Plus in Close Situations • Chamfered Ends Mean Socket Slides Quickly and Easy Over Nut Head • Ball Detents For Positive Locking To Ratchet • Micro-Accurate Fit Nickel Chrome Plated • Rust and Corrosion Resistant

ALL AMERICAN MADE



MI MAY 1981

6

IN MI OPINION

It's safe to read this month, folks. Nothing about nuclear power.

Instead, some miscellaneous ramblings about women and automobile styles and Bill Kilpatrick. First: We received an irate letter from a woman who received one of our subscription offers in which we referred to "guys" who like to build, repair, etc. We are, she claimed, sexist, which caused us no end of anguish. MI has, in the last year and a half, revised its thinking about women. We have seven on our staff, we have regular women contributors, and we picture them as doers, not as onlookers. Our research tells us that the overwhelming majority of our readers are male, but we suspect that there are a large number of women who read us as well. If you do, we would like to hear from you. No male chauvinist oink-ing will emanate from these pages.

Some weeks ago, we attended the New York Auto Show to look at all the wonderful stuff that we couldn't afford, and we were forced to do some comparing between fast cars of the 1930s and fast cars of a half-century later. Consider, if you will, such a wonderful machine as a Mercedes SSK. Flared fenders, elaborate bumpers, header pipes, running boards—an aerodynamic nightmare that fairly bespoke speed, money and glamour. Contrast it with a similarly quick and expensive car of today, which will be clean, functional, aerodynamically correct and, to this steadily aging eye, rather dull in comparison. A wedge is a wedge, even if it can do 150 mph. We realize the need of getting our coefficients of drag down below the magic .40 mark, but we would like to lament that we are losing quite a bit in the process.

And finally, a contest, which is to guess Bill Kilpatrick's age. We concede that no one could get as upset about as many things as Bill does without at least a few decades under his belt, but we'd like to know how much of a Methuselah you think he is. Please send your guesses to "How Old Willie?" in care of this office.

See, we told you there was nothing about nuclear power.

David E. Petzold

EDITOR

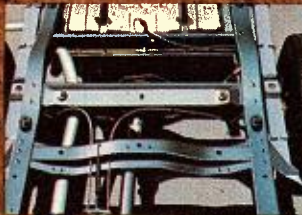
FORD VAN- OUT FRONT WHERE IT COUNTS.



Ford's out front again in range, up-front design and cargo space.

Tough Ford vans have unbeaten gas mileage ratings again for 1981...plus an estimated highway cruising range that beats other vans by hundreds of miles! Roomy comfort with Ford's exclusive engine-forward design. Payload up to 2½ tons. Ask your Ford Dealer about Ford's Extended Service Plan.

Tough! Body-on-frame construction, Twin-I-Beam suspension.



New Ford King of Clubs. A new level of luxury. Seats up to nine.

Unbeaten Van Mileage Longest Estimated Range

19 EPA EST. MPG* **26** EST. HWY.* **762** EST. MILES* **1,043** HWY. MILES*

Std. 4.9L (300 CID) Six with opt. overdrive trans.

Std. 22.1-gal. tank plus opt. 18-gal. aux. tank on 138" wb. Total: 40.1 gal.

* Compare these estimates with others. Your mileage and range may differ depending on speed, distance and weather. Actual highway mileage and range will probably be less than estimated. California estimates lower. Range superiority may be due to larger gas tank size rather than better fuel economy.



Spacious! Lots of options like tilt steering wheel and Captain's Chairs.

Great options! Quad Captain's Chairs swivel and recline.



**More Ford vans are on the road today
than any other make.**

(Based on R. L. Polk & Co. cumulative registrations as of 7/1/79)

FORD

FORD DIVISION



Address your letters to: ▼ Letters Editor, Mechanix Illustrated, 1515 Broadway, N.Y., N.Y. 10036

A '67 Impala? There is a small error in your "Best Car Poll Results" (Feb. '81). The car you list as a 1967 Impala is actually a 1965 Impala. I enjoy reading MI each month—especially the automotive section.

Richard Beissel, Jr.
Reading, Pa.

The picture you show is of a '65 or '66. Don Chaikin looks a bit young, so he may not remember them on the street. Just keeping you on your toes!

Merle L. Grate
Marion, Ohio

Please settle a small wager among three brothers. I say it's a '65 Impala; my brothers Don and Kirk believe the photo is labeled correctly. The loser (or losers) picks up the tab for an MI subscription. Who's right?

Jeff Gunn
Omaha, Neb.

Pay up, Don and Kirk!

Best Car. As a former cabbie and RFD mailman, I feel qualified to vote, however belatedly, in your "Best Car Ever" poll. Not to detract from the Ford Mustang, I have found that the car that outshines all others when the chips are down, the car predominantly used by po-

lice departments, taxi businesses and RFD mailmen is the Dodge!

Orville G. Botts
Anacortes, Wash.

MI's Hybrid Car. Your feature article in the February '81 issue, "Build Your Own Hybrid: MI's Urba Town Car," disgraces MI's reputation. How can you sponsor a project that assumes electricity is free? Nowhere are the overall operating costs discussed—it seems you just plug the car in and drive another 65 miles at 100 mpg. Hide your heads in shame, MI!

Derek A. Lewis
Gilford, N.H.

I rarely write to magazines praising their articles, but the Urba Town Car piece in your February '81 issue and the related article, "Can the Hybrid Car Really Help Us?" were outstanding examples of American ingenuity and creativeness. The Urba Town Car is indeed a rare and beautiful objet d'art both in construction and design.

Robert F. Notestine
Tucson, Ariz.

Thanks for the article on the MI hybrid car. During the last contrived fuel shortage, I built an independent parallel hybrid (IPH) similar to the Jet Propulsion Labs project. It was fun to wave at the people in the gas lines while I motored quietly and cleanly by.

Author Doug Bartholomew couldn't know about the three other assets of the IPH (mine may be the only one in existence) that were omitted from his oth-

erwise accurate and complete article. The first is dependability. If one drive system fails, there is a spare motor to keep the car going. The second is feeling socially responsible knowing you're not polluting the environment when the gas engine is off. And the third benefit is fun. It's a pleasure to drive switching between systems for performance and efficiency.

I think automakers are on the slow track with their expensive, unreliable computers. I say let the driver be the onboard computer.

Miles Power
Cambria, Calif.

Nuts on Inflation. Regarding the February '81 Nuts! column, let me tell you something about inflation. The car which cost \$8,500 60 days ago and costs \$8,700 today has not become more expensive. The present \$8,700 actually has less value than \$8,500 had a couple of months back. It's time people understood that they cause inflation because they always have their hands out. The response of the government is to print what is essentially counterfeit money to put into those hands.

Miles Rader
Boulder, Colo.

TO CHANGE YOUR ADDRESS OR ORDER A SUBSCRIPTION

Please use this form and allow six weeks for processing.

Name (please print)

Address (new, if for change of address)

City

State

Zip

To Subscribe:

check term below and fill in name and address above.

☐ 1 year \$9.94 ☐ 2 years \$15.95 ☐ 3 years \$19.95

Add \$2.00 per year in Canada. \$5.00 elsewhere

ATTACH CHECK AND MAIL TO:

MECHANIX ILLUSTRATED P.O. Box 8162 Greenwich, Ct 06836

AIE006

ATTACH LABEL HERE for address change or other inquiry
If you are receiving two copies, kindly send both labels
If moving, list new address above. Note your subscription will end with the issue shown at the upper right of your address label

SUBSCRIBER LIST SERVICE

Mechanix Illustrated and other direct mail advertisers take great care to send information about products and services only to those people interested in them. Products and services offered to our readers in the past have included merchandise and publication offers. We believe the distribution of such information is of benefit to our subscribers but we do respect the wishes of any subscriber who does not want to receive such promotional literature.

Should you wish to restrict usage of your name simply check here. ☐
Please attach a mailing label in the indicated area and mail to above address

INQUIRIES

MI will be happy to answer queries from readers concerning articles which have appeared in recent issues.

Please mail your questions to us at Mechanix Illustrated Information Dept., 1515 Broadway, New York, N.Y. 10036, along with a stamped, self-addressed envelope.

Seven & Seven. Sounds so good you can taste it.

Seagram's 7 and 7UP® over lots of ice. Crisp. Icy. Delightful.
And if you think it sounds good, wait until you taste it. Enjoy our quality in moderation.



SEAGRAM DISTILLERS CO., N.Y.C. AMERICAN WHISKEY - A BLEND. 80 PROOF.
"SEVEN-UP" AND "7UP" ARE TRADEMARKS OF THE SEVEN-UP COMPANY ©1981.

Seagram's 7 Crown
Where quality drinks begin.

No one knows lockblades like Case. It isn't just that we offer more different sizes and styles than any other knife maker. It's that each and every one is crafted to Case standards. With skilled hands still performing over 150 operations. And only the



The World's Finest Cutlery

finest materials being used for each handle and blade.

So if you're looking for a lockblade, the question isn't "Which manufacturer?" The question is, "Which Case?" Choose your Case lockblade at hardware and sporting goods stores.

Lockblades as big as all outdoors. As small as an inch and 3/8.



W. R. Case & Sons Cutlery Co. Bradford, PA 16701

Made in U.S.A.

Bill Kilpatrick (Jan. '81) touched a sensitive nerve—the flat-rate business, a.k.a. the repair racket. Those who use the flat-rate books say it's an averaging plan which keeps customers from being overcharged. What it really does is subsidize incompetent mechanics who boost the average cost of repairs by not knowing their business. I'm sure Mr. Kilpatrick gets as irritated as we do about hucksterism in the service field. Good for him.

Ray Sorel
Sarasota, Fla.

I have enjoyed MI for many years, but as the husband of a medical student I must object to the January '81 Nuts! column and the cartoon of Gree D., M.D. Several years of formal education have left us deeply in debt. It is unlikely that greed would drive a person into a profession that requires many years of expensive education and intense study. It is unfortunate that Bill Kilpatrick has nothing more to do than make unfounded criticisms.

Lewis F. Scheffler
Carbondale, Ill.

Auto Mail. The December '80 Auto Mail column gave some poor advice. Spraying gasoline around the joints of the intake system to check for leaks can be dangerous. It's much safer to spray a little oil. Also, although most of your articles are thorough and well-thought-out, some are nothing more than ads set in article form. I refer to these November '80 articles: "Home & Shop: The Sears Family," "A Space Heater that Lives in the Wall" and "... And One that Lives on the Ceiling." Concentrate more on good how-to articles rather than on information that can be obtained at any hardware store.

Michael Oliver
Columbiana, Ohio

Ad Cards. There were nine tear-out advertisements in the January '81 issue. I hate these miserable little interferences—I can't read the magazine with them in place. There are supposed to be 130 pages in this issue, but you count each tear-out ad as two pages. Therefore, I feel cheated out of 18 pages of the useful how-to information that I paid for.

Roger A. Schlemmer
Hudson, Wis.

As far as counting business reply cards as two pages (one page each side), we have no choice in the matter; Postal Service regulations require us to do so. As to why we include them in the first place, the answer is simple: We do it for our readers. Advertisers have found that a very great many readers respond to these ads, which is another way of saying that a very great many readers are interested in the goods and services these advertisers have to offer.

Runover Resistance. Why must you chop up every article? We waste precious time turning to the back of the magazine to finish one story and turning back to the front to find the next. If I weren't so lazy, I'd chop up this letter and stick a lot of junk between the first page and the last.

F. Rajewicz
Bristol, Conn.

Articles don't magically end at the bottom of a page. More often than not, there is more to be said than can fit on up-front display pages and we'd rather say it at the back of the book than deprive you of that information . . . or of the outstanding graphics of display pages that rightly should follow one another. MI



Best catches of the season from Shakespeare.

No matter what kind of fishing you plan to do this season, Shakespeare's got an Alpha™ rod-and-reel combination that's bound to catch your fancy. At a price that won't leave you cold.

Like our Alpha bait-casting combination. For under \$60, you get one of America's lightest, smoothest-working all-metal reels. It sports a high-speed retrieve and a drag system with over 200% more drag surface than other reels. Match it up with a strong, one-piece Alpha bait-casting rod, and you've got one of the most fishable combinations on the water.

For spin-cast fishermen, there's our rugged Alpha spin-cast

combination. An all-metal reel featuring fast, sure retrieves, a star drag mechanism that eliminates line twists, and a line-gobbling gear ratio. Tighten it down on a tough Alpha rod and you can go fishin' for less than \$25.

For less than \$35, there's our Alpha spinning combination. You get an Alpha 040 reel that features ball-bearing action. Selective Internal Trip™, a high-speed gear ratio, and a convertible handle for left- or right-hand retrieve. Plus a two-piece, ferrule-less Alpha rod that combines tough tubular construction with continuous butt-to-tip sensitivity.

All of which means that, for the price of somebody else's cheap rod-and-reel combination, you can hook into one of the best catches of the season.

An Alpha rod-and-reel combination from Shakespeare.

Shakespeare®
alpha™

America goes fishin' with Shakespeare


Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

8 mg. 'tar,' 0.7 mg. nicotine av. per cigarette by FTC Method.


Golden Lights. You really know you're smoking.

Give up double digit tar. But don't give up the pleasure.

Kings and 100s.
Regular and menthol.



The image shows a close-up of a hand holding a pack of Golden Lights cigarettes. The pack is orange with a blue and white vertical stripe. The brand name 'Golden Lights' is printed in large, bold, white letters with a blue outline. Above the name is a small blue logo of a castle or lighthouse. In the background, another pack of cigarettes is partially visible, showing green and white stripes and the words 'Go Li'. The background is a soft-focus green, suggesting foliage.


**Golden
Lights**



HOME & SHOP

A BONANZA OF BUILDING MATERIALS

By Burt Murphy HOME & SHOP EDITOR

THIS YEAR'S National Association of Home Builders (NAHB) show was a bonanza of building materials—a spectacle of new products and construction systems that speak to the present and future of where it's at and where it's going for the pro builders. Naturally, we concentrated only on the stuff of retrofit . . . that which benefits the do-it-yourself homeowner in the way of improvement potential and additive new construction.

For a consumer group that is supposed to have deep pockets and short arms to cope with tight times, the industry generally is a cordial contradiction of fine, upbeat, high-ticket items that collectively knock you out with technology and/or striking good looks. One gets the impression that although new money is tight, you're going to have to spend well for whatever you want.

For example, the bath now is a pleasure palace of fine appliances and hardware fixtures—and not at all hard to take, even if you have to sell the kids to get one. The whirlpool bath is *it*, typified by Jacuzzi with its spectacular lounge tub (obviously, for two . . . even more). Some other makers of equally fine and diverse design are American Standard, Kohler, Owens-Corning and Water Jet.

Lumber products for finishing interior and exterior walls are dazzling in beauty, grain, design. Louisiana-Pacific was one of the most notable, along with Masonite, Simpson Timber and two associations representing specific industries—the Red Cedar Shingle and Hand-Split Shake Bureau and Western Wood Products Associations.

Perma-Therm Barnboard by Artcraft presented their insulated (exterior) siding line. An instant, weathered siding.

Insulation panels (insulation sheathing) are a big item. Celotex was there with their Thermax. Some of the other insulation and insulating materials people: Owens-Corning Fiberglas Sheathing, Certainteed, Dow, Flintkote, GAF, Gold Bond, Homasote, Insta-Foam, Johns-Manville and United States Gypsum (their Foamular).

The window and door group was much in evidence. Andersen showed their new window replacement system (Perma-Shield windows and a system of filler and trim products that fit the window to the existing opening). Rusco introduced triple-glazed, thermal-break windows. Ditto Acorn with their Space-Age A-Therm Thermal Barrier System.

Simpson Timber has thermal doors and sidelights in

plentiful designs and styles. C-E Morgan has developed the Century Insulated Entrance System and claims up to a 75-percent reduction of heat loss normally attributed to a home entrance. Ceco doors and door systems were very good to look at.

Heating-equipment makers were on board with technologically advanced, energy-saving models. Notable among the group: The Coleman Co., Amana, Fedders, Carrier, Nutone, Airtemp, Bryant, Grumman, Honeywell, Sanyo, Thermador, Westinghouse and

York. These are just a few.

Wood-burning, heating fireplaces continue to be upgraded. Heatilator introduced The Advantage Fireplace, a downsize model that goes into more living situations without loss of big-fireplace heating clout. Preway showed their BK190 heat circulator and the Provider, a heating fireplace, among other entries. Majestic for the first time introduced Warm Majic and the Majic Heat Circulator—both of which are energy-efficient, heat-circulating fireplace systems. Queen Air was there with the fasci-

MI DISTAFFERS TAKE TO SAWS

Feedback from readers of home and shop projects is always welcome. The December 1980 article, "12 Christmas Gifts You Can Build," is a special example. Two MI staffers liked the Crane and Angel Weathervane projects so much that they bought saws for the first time and crafted their own favorites. We admire their work so much, we got together for a picture. Thank you, ladies.



MI staff members Linda Pedro, Classified Manager (left), and Hazel Fox, Advertising Makeup Manager (right), show the projects they crafted to Burt Murphy, Home & Shop Editor. Both women now are taking up crafts seriously and plan to buy more tools.

LONG DISTANCE HAULER. NEW DATSUN DIESEL



WHAT'S THE LONGEST DISTANCE BETWEEN TWO PUMPS? FOR DATSUN PICKUPS, IT'S OVER 550 MILES.*

Introducing the new Datsun diesel. It has the power and mileage you'd expect in a diesel, and in the Long Bed more range than any Datsun ever: 557* miles on a tankful, from an engine with over 3 billion miles of experience behind it. Datsun and diesel: a tough combination.

A TRUE TRUCK.

This rugged rig is a half-ton of tough, suspended in front on ride-smoothing independent front torsion bars. It hauls a full 1,400-pound payload of cargo and passengers on a ladder-type chassis. Just like a semi.

THREE TOUGH CHOICES.

Choose from the Long Bed, exclusive King Cab[®] or the Li'l Hustler[™]. .biggest choice in compact diesel pickups. Whichever Datsun diesel you pick, you're getting the greatest economy of all: miles per gallon and years per pickup. Just what you'd expect from Nissan Motor Co. Ltd., the worldwide company whose name stands for quality.

Want to go more miles between fill-ups? Go straight to your Datsun truck stop.

557 692

*MILES
EST.
RANGE

MILES
EST. HWY
RANGE

Range estimates based on EPA est. mpg and hwy mpg multiplied by 16.9 gal. tank. Use est. mpg for comparison, your mileage may differ depending on speed, trip length and weather. Hwy mileage and range will probably be lower. Not available in California.

33

EPA EST.
MPG

41

EPA EST.
HWY



RAIN DANCE® ACTUALLY OUTLASTS THE LEADING DEALER-APPLIED POLY.



Water Beading Proves It. DuPont Guarantees It.

Scientific tests prove: RAIN DANCE® shines longer, beads water longer than any leading car wax or poly-type car wax, including the leading dealer-applied poly sealant wax costing \$100 or more.

If you think we're all wet, just write for this fact folder to the address below.



America's #1 Premium Wax



GUARANTEED TO LAST LONGER: RAIN DANCE® is guaranteed to keep on beading and shining longer than the leading liquid or paste car waxes. Not even the leading dealer-applied poly sealant-type car wax lasts longer than RAIN DANCE. If not completely satisfied, return unused portion to B-4233, Du Pont Company, Wilmington, Delaware 19898 for full refund of actual purchase price and postage.

nating Forced Air Fireplace Furnace, a whole-house heating system.

Du Pont's Corian marblelike countertop designs once again mesmerized onlookers. This product line continues to hold the imagination because of its luxury and simple beauty. Du Pont take note: We spotted for the first time a Corian look-alike from Mexico called Marlan. The company is Ismex, S.A.

These products and manufacturers are a smattering only of the hundreds at NAHB, many more of whom are to be reported on in future issues.

Prediction. Look for direct-consumer light-steel studs (interior wall systems) in as few as two years. They beat construction-grade 2x4s because they are dimensionally stable and always true. Pros have them now, of course, but we'll get them later.

Recall. Sears wants to correct a possible problem on the Craftsman Motorized Miter Saw which could pose an operating hazard. Customers who have either the 315.23730 or 315.23731 models should contact their local Sears store for a free correction kit.

Warning. In-tank bowl cleaners containing calcium hypochlorite have been found to corrode toilet-tank parts. Check the label of the product you use. There are other brands you can switch to. **MI**

NUTS!

(Continued from page 148)

hours—about 50 miles—at a time with the long-range, 1½-pint fuel tank. Just think of the many uses you'll have for your bike with a Bumble-Bike Motor! It can make life so much easier . . . so much more economical . . . so much more fun!"

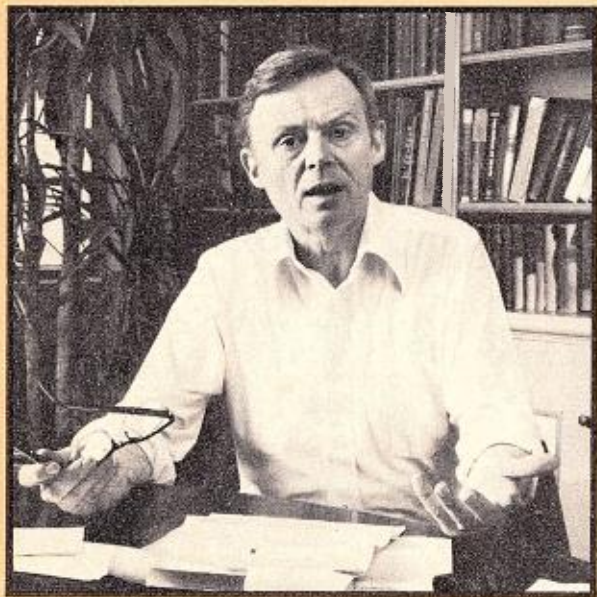
Well, they had us, of course, and the price—about \$180—was within comparative reason. We were on the phone to Havana, Florida, in a minute.

On our doorstep soon thereafter arrived a corrugated cardboard box that looked big enough to hold . . . oh, maybe one of those countertop toaster/broiler/oven combinations. It felt a bit light when we picked it up, but inside was, indeed, the motor, its necessary mounting hardware, a molded plastic fuel tank and what dawned on us really were authentic-looking "motorcycle-type clutch and throttle handlebar grips."

Hefting the latter for the first time, we felt the metamorphosis.

Some people say...

“I moved from the suburbs to the city and my auto insurance rates went up. What’s going on?”



That’s why we want you to know...

People who live in cities usually pay higher auto insurance premiums than people who live in suburban or rural areas.

Why? Because car owners in large urban areas face greater exposure to loss. The concentration of people and autos inevitably results in more accidents. (Traffic experts call it “friction of the system.”)

Theft and vandalism occur more frequently. And the costs of hospital and medical care, car repairs, lost wages, and lawsuits—all the things insurance pays for—are generally higher in urban areas.

Insurance companies want rates to be as fair as possible. Experience tells us the best way to do this is to charge policyholders higher or lower premiums according to their exposure to loss.

So, in making auto insurance rates, insurance companies consider the differences in costs by “territories” as an important factor.

We sympathize with those drivers whose place of residence puts them in higher rate categories. But if “territories” were eliminated, people who live in less congested areas and who, therefore, have less exposure to loss would end up subsidizing people who live in large urban areas and who have far greater exposure to loss.

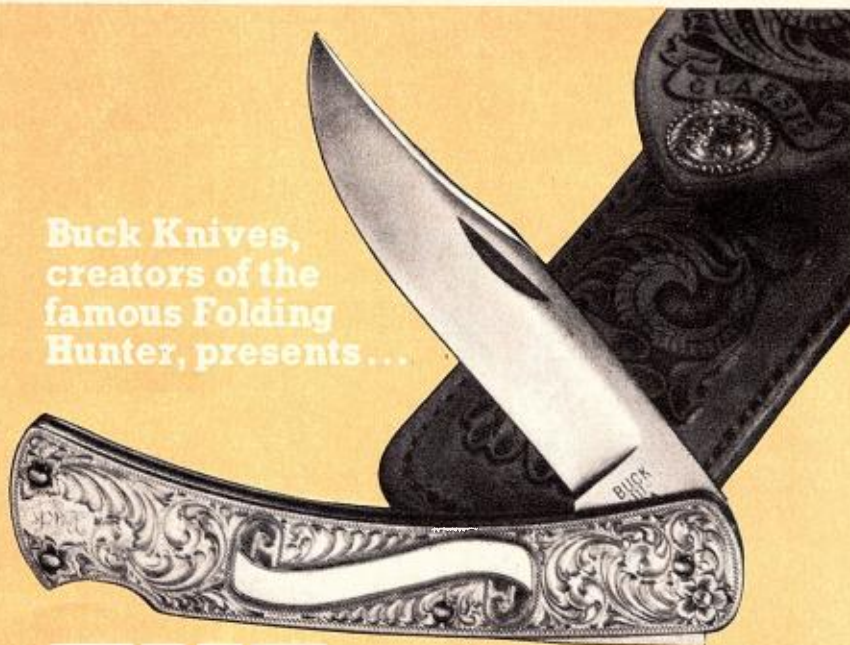
And we don’t think that’s fair.

We’re working to keep insurance affordable.

This message presented by the **American Insurance Association**, 85 John Street, NY, NY 10038

©1981 American Insurance Association

Buck Knives,
creators of the
famous Folding
Hunter, presents...



THE CLASSIC

When Buck designed the first lock-blade folding hunting knife in 1963, it literally revolutionized the field. Imitated by many, it's never been equalled. Now Buck introduces *The Classic*. This magnificent new knife offers all the inherent advantages of the Folding Hunter, but is much lighter in weight with its beautifully patterned aluminum handles. The Classic comes in its own natural brown leather sheath with matching engraved look. See The Classic (Model 111) now at your favorite dealer. It's a classic you'll want to own!

BUCK
KNIVES

Famous for holding an edge!

For free booklet, *KNIFE KNOW-HOW* write:
Buck Knives, Inc., Dept. MI-581, P.O. Box 1267, El Cajon, CA 92022

begin; our fingernails needed cleaning and for a flash we experienced a certain kinship with Dr. Jekyll as he held before his blazing eyes a vial of his vile potion.

Less than an hour later, in a big and empty parking lot, the motor installed, we pedaled off and at about 5 mph switched on the electronic ignition (no less!), cranked the throttle grip once or twice, then eased in the clutch, thus lowering the cross-hatched drive hub to the rear tire's tread. The little motor coughed a couple of times, then burst into a steady,

subdued buzz and suddenly we felt coarse, black hair beginning to sprout from our jowls and forearms. Within half an hour we were leaning into corners at speed, were weaving to and fro through and around imagined obstacles. Whenever we came to a halt we found ourself blipping the throttle with all the casual expertise and sneering disdain of a motorcycle hood at a traffic light. It was along about then that we noticed our Right Guard was beginning to fail us.

It didn't take us long to get out on the bike paths, and it didn't take us

long to appreciate that on same we weren't necessarily welcome, especially on paths we shared with pedestrians. As quiet as the Bumble-Bike motor is, everyone on the paths—fellow cyclists, walkers and a terrifying assortment of dogs—could hear us coming. Grudgingly, passing room was made for us and disapproving heads would be shaken as we whizzed by. Following three or four such encounters—and on that very first day, too—there appeared on the back of our right, or throttle, hand a tattoo of what we think is a skull-and-crossbones. (It's hard to tell because of our new growth of thick, dark hair.)

Within a week the metamorphosis was almost complete. We found ourself an aggressive veteran of rush-hour traffic and noted that we had acquired a number of startlingly expressive epithets with which to accompany certain digital gestures we for some reason felt compelled to make when being addressed by red-faced drivers of aging Pontiacs, seemingly all of whom resented the simple common sense of our economical mode of transportation. Also within a week we not only were waving as we passed gas stations, but we had tapered off on shaving and showering and began skulking around the dimmer reaches of newsstands, there to snort and chortle over the suddenly-gratifying crudities of publications that just a few days earlier we had no idea existed. Standing in sparse light—hirsute, reeking and turning pages that strive somehow to couple exposed bosoms with severely distorted Harley-Davidson motorcycles—we experienced a wash of brotherhood with a much-reviled outlaw band; we were almost a biker, even though our horsepower was/is only 1.3.

Biker or not, however, we were something else. As our Ol' Lady (once known as Dear Heart), sniffing the two-cycle volatile liquid hydrocarbon premix and general grunge of which we are now redolent (replacing the Dove and bay rum of yesteryear), put it: "You've changed, Willie. What with that greasy primary chain you're wearing as a belt and those shades, man, you're no longer the slim-hipped, apple-cheeked, happy-go-lucky lad I married." (Exercising remarkable restraint at the time this was said to us, we merely crushed an empty Coors can with one hand and hurled it in the lady's direction, a menacing curl to our upper lip. Later on, when the beard is full-grown and we have a little more scoot time, we'll be able to punch her out with the best of 'em.

Can the new Administration handle this kind of change? **■**

YOU HAVE 10 DAYS TO DISCOVER THE COMPUTER AGE.

If you've never used a computer, you're missing something. Programming your own computer is more fun than playing backgammon. More challenging than crossword puzzles.

And more practical than about anything else you could do.

Because the fact is, you're living in the age of computers. And now you can discover what it's all about. For 10 days, at no risk and no obligation, you can have your very own Sinclair ZX80 computer. To play with, experiment with, learn with.

ANYONE CAN USE IT.

You'll discover the ZX80 is incredibly easy to use for anyone 10 years or older. You don't have to know anything about computers when you start out. We'll send you a complete 128-page guide that takes you step-by-step into the world of computing. In one day, you'll be writing your own programs!

The ZX80 will absorb you for hours as you find new ways to use it. You can create games. Home budgets. Math lessons for your children. Almost anything, in fact.

THE ZX80 IS YOURS FOR 10 DAYS. THE COMPUTER GUIDE IS YOURS FOREVER.

For your 10-day home trial, just call our toll-free number and order with your Master Charge or VISA. Or send the coupon along with a check or money order for the remarkably low price of \$199.95, plus shipping. (Other personal computers cost two or three times as much!)

And we'll send you the Sinclair ZX80 personal computer. It's yours for 10 days. If you decide you don't want to keep it, then send it back. We'll give you a full refund. Either way, the 128-page guide to computing—a \$5.95 value—is yours to keep as a free gift.

But we have to be honest with you. After you've discovered the fun of owning a ZX80 computer, we don't think you'll send it back.



EVERYTHING YOU NEED. For just \$199.95, you get everything you need to operate your ZX80. You just hook it up to your TV (either black & white or color). Then to store your programs, you can use any ordinary cassette tape recorder. We'll also send you a 128-page guide to computing that's yours to keep as a free gift.

\$199.95



For an extra \$49.95, you can also have the Sinclair Computer Learning Lab—a set of 100 experiments and lessons on cassette tapes that make the ZX80 itself your teacher.

10-DAY MONEY-BACK HOME TRIAL CALL TOLL FREE 800-543-3000.

Ask for operator #508. In Ohio call 800-582-1364. Phones open 24 hours a day, 7 days a week.

Mail to: Sinclair Research Ltd.
One Sinclair Plaza, Nashua, N.H. 03061

Check one:

☐ ZX80 Personal Computer \$199.95
Shipping \$ 4.00

☐ ZX80 Personal Computer \$199.95
Computer Learning Lab \$ 49.95
Shipping \$ 4.00

Total \$203.95*

Total \$253.90*

If I'm not fully satisfied with my purchase I can return it in 10 days for a full refund. The 128-page guide is mine to keep.

Name _____

Address _____

City, State, Zip _____

*U.S. dollars.

sinclair

SINCLAIR RESEARCH LTD., ONE SINCLAIR PLAZA, NASHUA, N.H. 03061

05MI

CAR CARE

SERVICING THE OLD BOMB

By Paul Weissler



THE UPHOLSTERY is shot, the body is riddled with dents and you certainly wouldn't trust it on a long trip. It's an old bomb. You couldn't get \$350 for it, but it's your second car and you need it for the short run to work, the train or bus. It also serves as a backup to keep you on the move when your late-model is down for repairs.

You've got to keep the old bomb running safely and reliably. You don't want to sink a bundle into it, but you want to get the most for your maintenance and repair dollars. Your primary concern, obviously, is to avoid expensive repairs. There are no absolute certainties in this world, but oil—even at today's prices—is a lot cheaper than an engine, transmission or rear axle. If you keep the oil fresh and up to the specified level, you have a better chance of keeping the power train operational. Each part of that power train—engine, transmission and rear axle—deserves close attention.

Engine

The older an engine gets, the greater is the amount of blowby—exhaust gases that slip past worn piston rings and into the crankcase. Further, the car used in short-trip driving really never warms up, except in summer, so fuel droplets that also get into the crankcase during cold operation don't evaporate. They just get recirculated by the crankcase-ventilation system.

Exhaust gases and raw fuel contaminate engine oil. The best way to get rid of them is to change oil frequently (every two months in moderate weather, every month in cold weather). You don't have to use the super-premium SF oils if you change that frequently. A less-costly SD or SD-SE is fine.

Transmission

After checking engine fluid levels, go to work on the automatic transmission. To prevent varnish buildup, once a year drop the pan and change oil and filter (or clean the screen in sol-

vent). And don't stint on transmission fluid. Cheap off-brand fluids (Suffix A) affect shift characteristics as well as the life of bands and clutches. Get a good name-brand fluid. Also, make sure you get the right modern fluid. Only older Fords take Type F fluid; all other cars use Dexron. If you use Dexron in a Ford designed for Type F, the shifting may get sloppy.

In addition, get a band adjustment every two years on automatics that have adjustable bands (Chrysler TorqueFlite and AMC Torque Command, all but late-model Ford products and GM Turbo 250 and PowerGlide).

If your car has a manual transmission, check fluid level at every engine oil change. Top up, if necessary, since a low fluid level

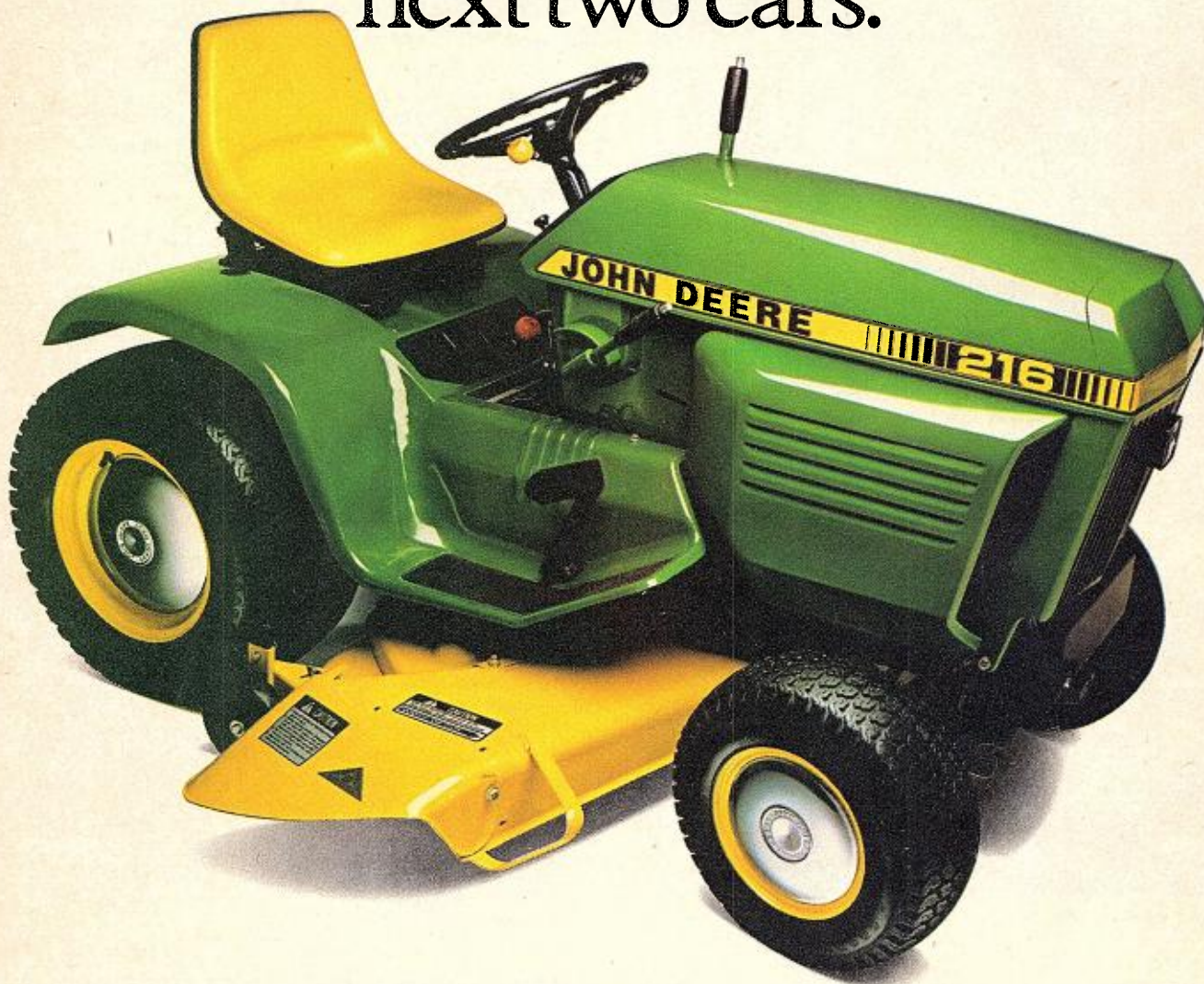


New battery can help ease starting problems, but corroded cable terminals negate investment. Wire-brush corrosion from terminals. If terminals are severely corroded, replace them.



Adjust points and check distributor cam for wear. Set gap on the least worn lobe—it provides largest gap—to specs. Then make sure gap of most worn lobe is at least .010 in.

A John Deere Lawn and Garden Tractor will probably outlast your next two cars.



How many years do you get out of an automobile? Five? Six?

A John Deere Lawn and Garden Tractor will probably last more than twice that long.

Ten- to 15-year-old John Deeres are not at all unusual. In fact, many of the original Model 110 Lawn and Garden Tractors, built 17 years ago, are still in use today.

You get plenty of mileage out of a John Deere Lawn and Garden Tractor, too. People use them year-round for mowing, landscaping, tilling, leaf disposal and snow removal.

Test-drive the new 1981 models at the John Deere dealer near you.

They come in seven different models, ranging from a 10-hp with gear drive to a 19.9-hp hydrostatic. And they're all built to last.

Don't you wish John Deere made automobiles, too?

DOWN-TO-EARTH VALUE. \$10 OFF PER HORSEPOWER. Buy a John Deere Lawn and Garden Tractor before May 31 and you can save up to \$200 at a participating dealer.

Nothing Runs Like a Deere®

For a free folder, write John Deere, Dept. 50, Moline, IL 61265.

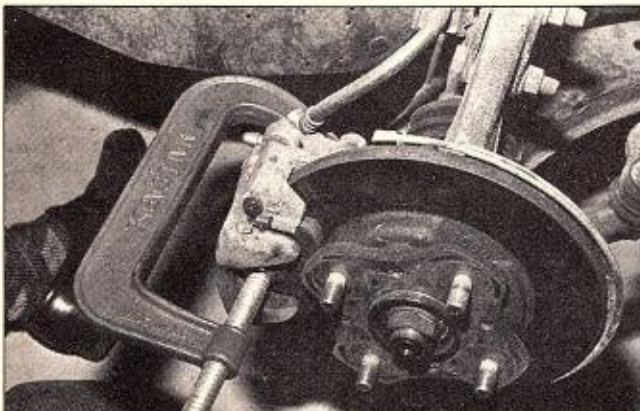




Lubricate ball joints twice a year. They're in the extra-care category since replacement is so expensive. If both upper and lower ball joints have fittings, be sure to hit them both.



Check drum brakes while car is jacked up. Make sure wheels spin freely, then have a helper apply brakes. Wheels should lock up. If any wheel drags, check shoes and wheel cylinders.



Disc-brake drag can be double-checked by trying to force back caliper piston with C-clamp. If caliper goes back smoothly as you release clamp's screw, the piston is all right.

can cause excessive wear of bearings, gears and synchronizers. Change oil at least once every two years. If the gearbox doesn't have a drain plug, siphon out as much oil as possible from the fill-plug hole, then top up.

Rear Axle

Every engine oil change also should include a check of the rear axle fluid level. Most rear axles don't need periodic oil changes, but many have seized unnecessarily at high mileage because they were totally ignored—minor seepage over the years can create a severely low oil level. Add oil as necessary.

Front End

Pay attention to the front end, too. Put ball joints in the extra-care category. If they go, they can cost well over \$100 to replace. If you're unlucky enough to have a model with ball joints that can't be pulled out of the control arms, the tab can easily double. To give yourself the best chance of having the ball joints outlive the need for replacement, lubricate them twice a year. If both upper and lower ball joints have fittings, be sure to hit them both.

Also, don't try to nurse shock absorbers past their prime. The extra punishment the bouncing car

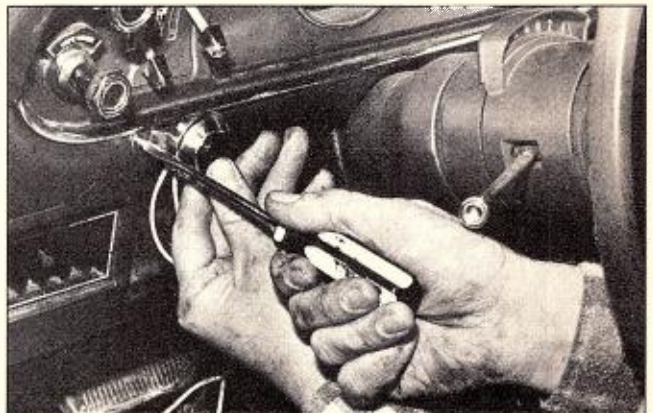
gives the tires and suspension defeats your maintenance. A complete set of shocks as good as the original equipment can be purchased for under \$25 in discount houses. It takes only an afternoon to bolt them in.

If the springs sag, don't spend the money to have them replaced. Instead, install shocks with overload springs (or air shocks). They'll compensate for all but severe sag.

Low Cost

When you need repairs, the object should be to do them for as little as possible. Keep in mind, though, the object also is a satisfactory result. This means you should look first in a wrecking yard for a satisfactory used part, then at a parts store for a rebuilt. You really shouldn't consider a new part if it costs more than \$25.

You also should keep your workload down. After all, why spend more time than necessary to keep the old bomb going? Say, for example, the steering-wheel horn switch goes. You could pull the wheel and hunt for detail parts to fix it. If it's a rim-blow type, you might even get lucky and find a wrecking yard with a similar replacement. But why bother? All you want is to be able to blow the horn.



Universal horn switch mounted to dash replaces defective steering-wheel horn switch. It's a quick, cheap repair. Other universal switches can replace other equipment as it wears out.

There's More Than A Shade Of Difference In Pressure-Treated Wood

Q&A

Q. Can you tell a quality treated wood by its color?

A. Not really. While most treated woods for use in exterior building jobs are green in color (and that's a clue) there are important differences.

Q. What are those differences?

A. There are two big ones:

Retention — Is there enough preservative retained in the wood?

Penetration — How deeply is the preservative impregnated in the wood?

Q. How much retention is needed?

A. That depends on the intended use. **Wolmanized**® wood pressure-treated to a minimum of 0.25 pounds per cubic foot has sufficient retention for above ground use. For in-ground use, choose **Wolmanized** wood treated to 0.40 pounds per cubic foot. Or select **Outdoor**® brand wood, which is always treated to a minimum of 0.40 pounds per cubic foot. For more demanding applications, such as in salt water, consult your dealer.

Q. What about adequate penetration?

A. Unless the preservative has penetrated deeply enough, any small checks that appear in the wood will expose untreated wood to decay and insect attack. You can be confident of adequate penetration if you look for the brand names "Wolmanized" or "Outdoor" on the wood you buy.

Q. Should I be concerned about things like grain and knots in the wood?

A. Sometimes. For some uses. **Wolmanized** pressure-treated lumber is available in various lumber grades—high appearance grades for use in building decks and furniture, and rustic grades for fences and landscaping projects. With the exception of posts and column supports, **Outdoor** wood will always be No. 1 grade material.

Q. How do I avoid wood that will twist or warp?

A. When not properly nailed or fastened, it is a natural characteristic of wood to twist and warp as its moisture content changes. The chance of warpage and other problems is minimized when you buy wood that has been dried after treatment. Look for the word "dry" near the "Wolmanized" diamond. Or choose **Outdoor** wood which is always dried after treatment.

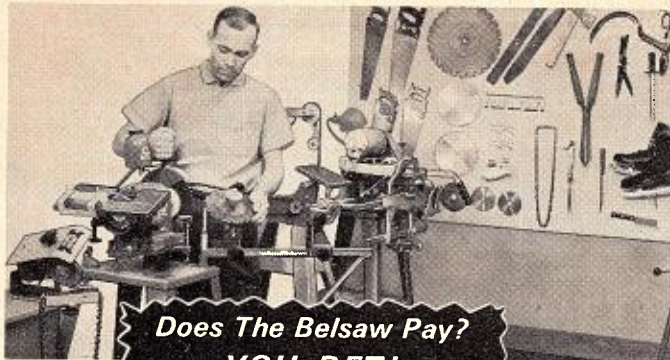
Q. What are those brand names again?

**OUTDOOR
WOOD**®

Wolmanized®
Pressure-Treated Lumber

"The Right Stuff"

For more information write: Koppers Company, Inc., 1904 Koppers Building, Pittsburgh, PA 15219
© 1981 Koppers Company, Inc.



**Does The Belsaw Pay?
YOU BET!**

**\$5-\$6
an hour**

**100%
Disabled**

**Wanted
to
Retire**

**No Selling, No Inventory...Year Round
Cash Profits and YOU Set The Hours!**

"On Saturdays, my big day, I take in \$45 to \$55. Other days I average less, but I figure I make between \$5 to \$6 per hour . . . and sometimes more. I am presently enlarging my shop, and thank BELSAW and their fine equipment for making it possible."

V. O. Miller Hubert, North Carolina 28539

"I was disabled by an accident while employed as an iron worker. They declared me 100% disabled and said I'd never work again. I don't think I could work for anyone else but I started my sharpening business part-time and now it's turned into a full-time job with more work than I can do."

Tampa, Florida 33614

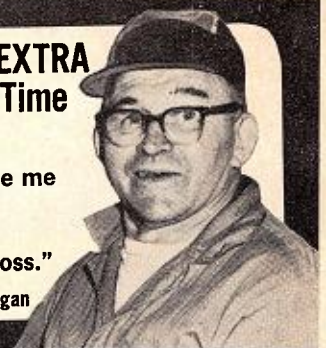
"I had dreamed of retiring for years, but was afraid to quit my salaried job. I had never used this type of equipment, but the SHARP-ALL was real easy to learn. I sharpened 30 blades my first week — without advertising at all. Now, for the first time in my life, I can say that I am content."

Farris Cornelius Wellington, Texas 79095

**Makes Over \$60.00 EXTRA
a Week In His Spare Time
Sharpening Shop!**

"My Belsaw Sharp-All made me
an extra \$3,500 last year.
Now I am going full time.
It's great to be your own boss."

DAVID SWANSON—Utica, Michigan



**Let Belsaw prove
YOU can do it, too! On our
30-DAY FREE TRIAL OFFER**

SEND FOR FREE FACTS! Our Free Book tells how to start a profitable, lifetime home sharpening business, how we help you grow, how we'll finance you.

**FIND OUT ALL ABOUT IT
No Obligation —
No Salesman Will Call**

BELSAW SHARP-ALL CO.
742B Field Bldg.
Kansas City, Mo. 64111

No Obligation . . . No Salesman Will Call

BELSAW SHARP-ALL CO. 742B Field Bldg., Kansas City, Mo. 64111
Send details of FREE TRIAL OFFER and Free Book "Lifetime Security"

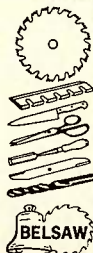
NAME _____

Address _____

City _____

State _____

Zip _____



For this simple purpose, buy a universal horn switch. It should cost less than \$2. If possible, clamp the switch to the steering column, but if you can't, just drill a couple of holes in the dash and mount the horn there. Run a wire from one switch terminal to the horn relay S terminal (disconnect and tape over the old wire). Then run a second wire from the switch's other terminal to the nearest electrical ground. Position the universal switch so you can reach it easily. You'll quickly get used to it.

Use universal switches, if necessary, for any other dashboard application. You may have to drill a hole or file one to enlarge it, but if it eliminates hunting for a duplicate replacement, it's worth the effort.

Inspect the exhaust system frequently—a good time is during an oil change. This way, you'll see a hanger coming apart

or a loose clamp before the exhaust drops down. Also, look for small holes in the piping. If you can catch a hole when it's small, you can patch it inexpensively. Remember, the low special prices you see advertised for a muffler are not representative of the entire exhaust system; a piece of pipe could be expensive.

Learn to do without. In short-trip driving, the coolant is just getting warm as you're completing your trip. So, if the heater isn't working, it may not be worth fixing. A new core can cost well over \$100. If the heater leaks, pour some sealer into the radiator. If this doesn't work, pull off the heater hoses (usually accessible from under the hood) and connect them with a flushing tee or piece of pipe and bypass the heater.

Brakes

In the short-trip, low-speed

driving the old bomb typically is used in, you may hardly hit the brakes. So when the car takes a week-end rest, the pistons in the brake cylinders or calipers may seize. They may fail you the first time you really have to stop the car in a hurry.

When you have the car jacked up for a lube job, make sure all wheels turn freely. Then have a helper apply the brakes; recheck to be sure they lock up. If any wheels drag, remove the wheels and drums. (Use a puller if the drums stick on after backing off the shoes.) If you see that the shoes are not retracted fully, check the wheel cylinders for sticking pistons, (by trying to force the shoes back with a pry bar.) If the shoes won't budge, install new wheel cylinders.

There is some drag built into a disc brake, so double-check by trying to force back the caliper piston with

a C-clamp on the caliper. If it goes back smoothly as you turn the clamp forcing screw, the piston is not seized.

Easy Starting

Finally, you want the car to start easily, particularly if you're using it to get to work. A new battery is great, but if the cable terminals are corroded, the car still may not start. Wire-brush corrosion from the terminals. If the car has replacement terminals, don't try to keep them around too long. Once they've been severely weakened by corrosion, they may not grip well even after cleaning. A new replacement is less than a dollar. That's an investment you should make.

Keep the engine compartment clean. Old cars tend to blow oil fumes out the fresh-air intake, which contaminates everything in the engine compartment,

(Continued on page 40)

NTS BUILDS STRONG SKILLS FOUR WAYS!

FOUR EXCITING CAREERS TO LEARN AT HOME ON SOME OF THE FINEST EQUIPMENT AVAILABLE ANYWHERE!

It takes strong skills to prepare for a career in today's most rewarding fields. And for seventy five years, National Technical Schools has been teaching these kinds of skills through home study courses. Courses that actually train you on state-of-the-art equipment you'll often find on the job. In fact, in many cases, you'll use the equipment you've built as part of your NTS training in the field of your choice.

1 ELECTRONIC/COMPUTER DIVISION:

NTS will teach you the latest industry developments, including a thorough working knowledge of advanced digital electronic systems. Computer students will build and learn to service their own Micro-computers, plus related testing and support systems.

Color TV Servicing students will build their own solid state testing gear, and ultimately the famous NTS/GR2001 Heath 25-inch (diagonal) Solid State Color TV—the most advanced color TV ever supplied with a home training program.

2 MECHANICS DIVISION:

We'll provide the training and equipment you'll need to handle maintenance and repair on cars, trucks, even diesels in the following areas: advanced diagnostics, motor overhaul, transmission, electrical and overall servicing.

Oscilloscope, dwell-tach, electrical tester and other top quality test equipment and tools included with courses.



3 AIR CONDITIONING, REFRIGERATION/HEATING DIVISION:

Learn to service commercial, industrial, residential heating and cooling equipment. We supply hermetic unit analyzer, leak detector, charging/purging manifold set, tools, plus the know-how you'll need to use each tool effectively.

4 HOME APPLIANCE DIVISION:

Cash-in now by learning to repair and maintain washers, dryers, ranges, and smaller appliances. NTS provides thorough instructional training plus a multimeter and special NTS Circuit Trainer.

GET STARTED ON A CAREER RIGHT AWAY! FOR COMPLETE DETAILS, SEND FOR OUR FREE FULL COLOR COURSE CATALOG TODAY! JUST MAIL-IN THE CARD OR COUPON NOW!

NO OBLIGATION. NO SALESMAN WILL CALL.

NTS NATIONAL TECHNICAL SCHOOLS

TECHNICAL-TRADE TRAINING SINCE 1905
Resident and Home-Study Schools
4000 SO. FIGUEROA ST., LOS ANGELES, CA. 90037



NATIONAL TECHNICAL SCHOOLS Dept. 203-051
4000 South Figueroa Street, Los Angeles, CA 90037

Please send FREE color catalog on course checked below

- ☐ MicroComputers/MicroProcessors
- ☐ Communications Electronics
- ☐ Digital Electronics
- ☐ Industrial Technology
- ☐ Color TV Servicing
- ☐ Auto Mechanics
- ☐ Air Conditioning
- ☐ Home Appliances

Name _____ Age _____

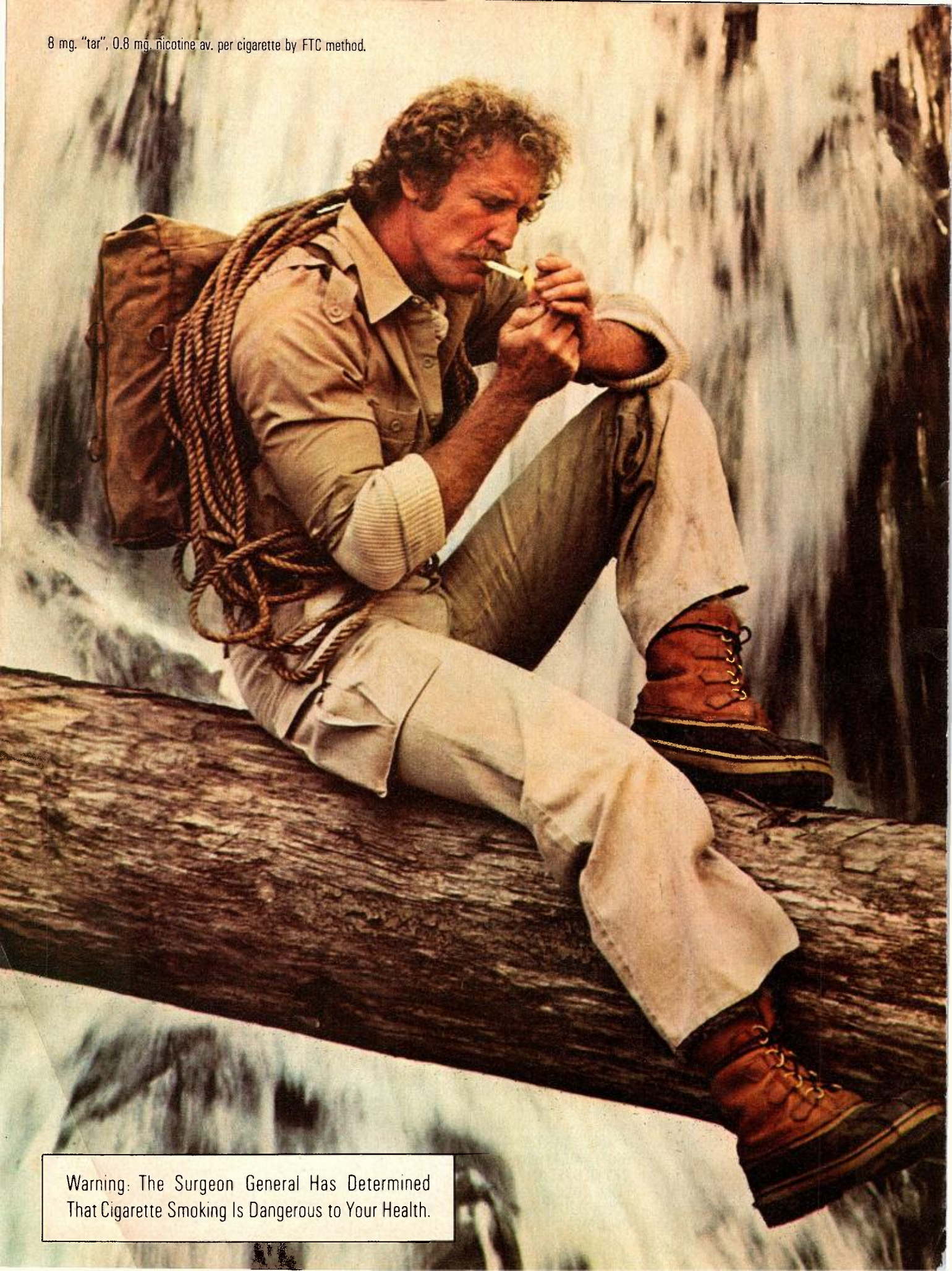
Address _____

Apt. _____ City _____

State _____ Zip _____

- ☐ Check if interested in G.I. information.
- ☐ Check if interested ONLY in classroom training in Los Angeles.

8 mg. "tar", 0.8 mg. nicotine av. per cigarette by FTC method.



Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

CAMEL

Where a man belongs.

Camel Lights.
Now in a new pack.
Same low tar,
same Camel taste.

8 mg
tar.



ROUGHING

With Norman Strung

IT

GETTING WOOD CHEAP

THE PRICE of lumber, like everything else in heaven and earth, has climbed to a point where you feel it's a sacrilege to put nails in the stuff. But unless you're doing trim or finish carpentry, there are ways to cut the cost of building with wood from 25 to 100 percent.

House rafters, studs, stringers and joists are ultimately hidden behind some kind of facing, so there's no need to pay the extra bucks for finished wood. Rough-cut lumber (lumber that has been sawed from a log but not planed) usually costs 25 to 35 percent less than finished lumber. This saving results from the elimination of the finishing step and the fact that you buy your material direct from the mill. Lumberyards seldom carry rough lumber.

This may present a problem to city-dwellers, since mills are bound to be out in the boondocks. But a friend of mine who lives on Long Island regularly journeys to a mill in upstate New York with a rented trailer. He returns with a full load and sells half of it to his neighbors at a modest profit (but still low cost to them), which pays for the trailer rental, the gas and his time.

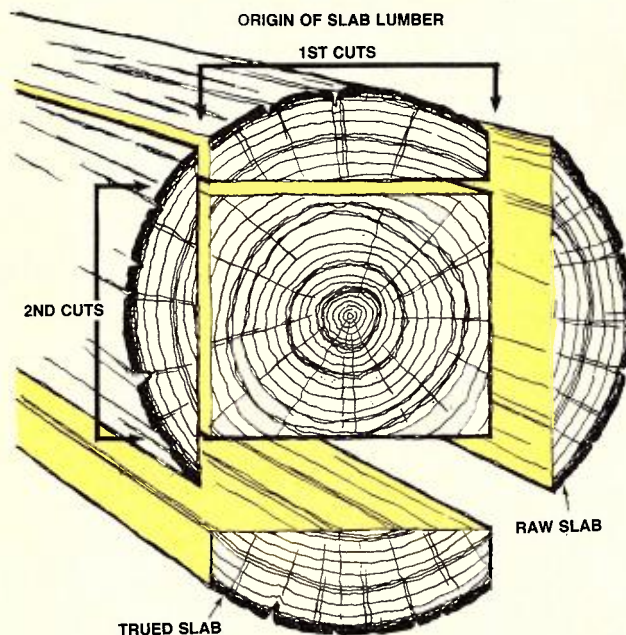
Rough-cut lumber also affords structural advantages not found in finished wood because it has true dimensions. In other words, 2x4s are indeed 2 inches

by 4 inches, rather than 1½x3½, the actual dimensions of a planed 2x4. Similarly, 4x4s measure 4 inches by 4 inches, 1x12s are a foot wide, and so forth.

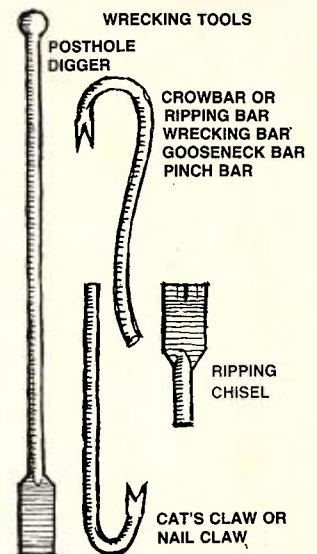
The burning question that remains is: If this material is cheaper and stronger than finished wood, why isn't it used more in commercial construction? I've asked that question often, and the only answers I've gotten are that rough-cut lumber is more liable to warp than planed lumber (I haven't found this to be true) and that carpenters get splinters in their hands when they work with it (poor dears).

Slab lumber is limited as a construction medium, but it's dirt cheap. To understand what it is, you must

understand its origin. When cutting dimensioned lumber from a round, tapered tree trunk, the saw must first make four outside cuts to square up the tree. The planks from the first cuts will be flat on one side (raw slabs). Those from the third and fourth cuts will be flat on three sides (trued slabs). Both raw slabs and trued slabs make excellent fencing material. Depending upon the thickness and contours of the trued slab, it also may be used as a structural member. Don't worry if they don't look perfect. Remember, in a house they'll be hidden behind ceilings and walls, and in a barn or garage, nobody really cares. I've used slab lumber for fencing, as frames for a greenhouse and for a pole shed



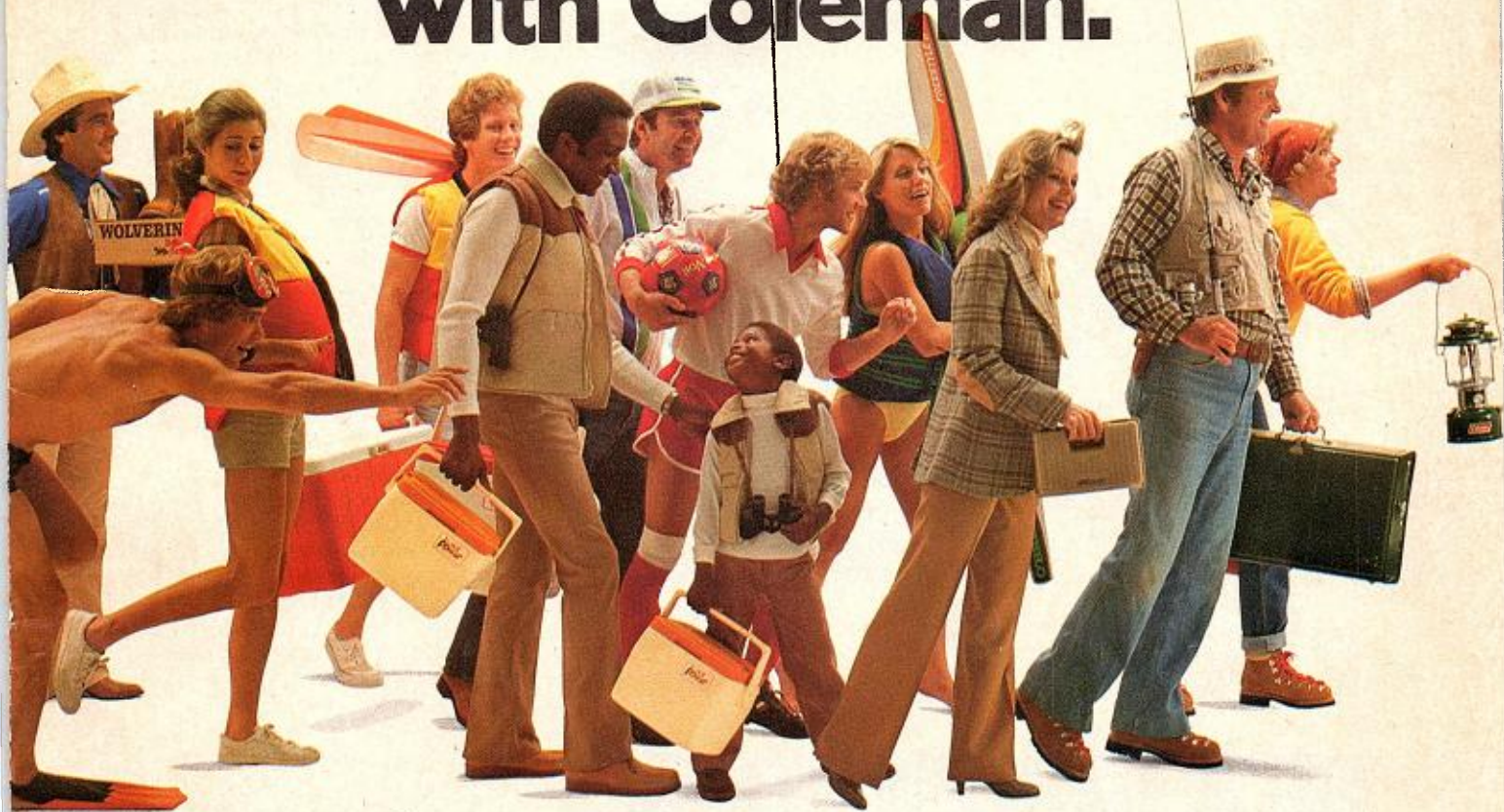
Before cutting dimensioned lumber, saw makes four outside cuts to square tree trunk. First two cuts deliver planks that are flat on one side (raw slabs). Planks that are flat on three sides (trued slabs) come from the third and fourth cuts.



that houses my several boats. At most it will cost the going price of firewood—the purpose for which it is commonly sold. If your in luck, you may even get it for nothing.

Dimensioned lumber often can be salvaged from razed buildings. Wreckers who've contracted to take down a house sometimes sell the salvaged lumber for about half the market value of new wood. Other times, when old houses are bulldozed and carted away to the dump, you may be able to make arrangements with the wrecker to haul away whatever usable lumber you can scavenge. I once hit upon a veritable gold mine this way when post-World War II housing was being razed on the campus of a nearby university. Before the bulldozing began, I had the wrecking contractor point out the houses that were to be demolished last. I had a whole week to work those buildings over,

Good deals for you for Good Times Outdoors with Coleman.



There's never been a better time to head outdoors—where so many of the best things in life really *are* free.

And the best way to go is the Coleman way. You can equip yourself with all the gear you need for years of fun, at a price you used to pay for a few nights in a hotel or resort.

To make it even easier, we've put together the Coleman "Good Times Outdoors Catalog"—loaded with coupons for rebates, premiums and other values from Coleman and other great names outdoors.



Send in this coupon for your Coleman Good Times Outdoors Catalog™. Or pick up one at a participating Coleman Dealer. Coleman Good Times Outdoors offer is good on purchase of couponed items from March 15, 1981 to June 30, 1981.

Name _____

Address _____

City _____

State and Zip _____

Mail to: The Coleman Co., Dept. Good Times,
Wichita, KS 67201

Coleman • Shakespeare • Wolverine Boots • O'Brien Water Skis • AMF Voit

FASTEN WITH STANLEY POWER.



BE A SUPER DOER.™

More and more do-it-yourselfers are becoming Super Doers, with help from Stanley. Like four different styles of screwdrivers, Workmaster®, Handyman®, Jobmaster™ and Thrifty™. Whatever the fastening job, fasten it right with Stanley. The tools used by America's Super Doers.



STANLEY helps you do things right.®

© 1981, Stanley Tools, Division of The Stanley Works. Super Doers is a trademark of Stanley Tools

and my wife and I carted home pickup load after pickup load of 2x4s, 2x12s, 1x12s and oak flooring, all for free.

In the process, I discovered several wrecking tools that are useful when you want to get serious about tearing houses apart. Posthole diggers have a steel knob on one end, a chisel-type blade on the other, they are 69 inches long and weigh in the neighborhood of 30 pounds. With that weight you get the inertia to drive the chisel blade between nailed-together wood. The length gives you the lever-

age to break the nail's hold and pry the wood apart.

Crowbars have a chisel blade on one end. The other end resembles a shepherd's crook with a nail puller at the tip. Crowbars are used to pry separated wood farther apart and to pull nails. They come in several lengths, but the size I find most useful is about 30 inches long. There's also an advantage to using two of these tools at once.

A ripping chisel has a chisel blade with two nail pullers; a cat's claw is a small, goosenecked nail puller that

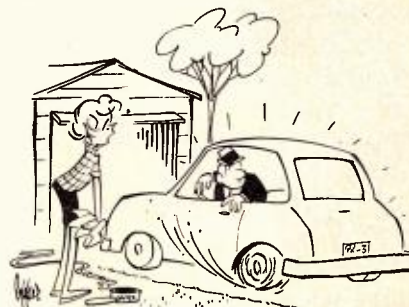
can be hammered down around the head of the most tightly set nail. Both tools are useful during final cleanup, as you stack the salvaged wood in a pile. A chain saw, an 8-pound sledge hammer and a 16-pound sledge hammer round out the mayhem. When you saw, you're bound to hit a nail or two, so if you have an old, worn-out chain, use it. In this line of work neatness, most emphatically, doesn't count.

There are a few tricks to building with salvaged wood. First, it's very dry, so you will likely split any lumber with nails in the end, no matter how careful you are when you're wrecking. Thus, lumber must be trimmed and squared, which translates into 7-foot ceilings when you start with 8-foot studs. This is a workable mode, however, since it eliminates a foot of dead air space that you never use, but pay to heat nonetheless.

This same tendency to split suggests the wisdom of predrilling nail holes. If you don't take this step, half the butt-ends will splinter and, on those that don't, even the most truly driven nail will bend like a pretzel.

Although salvaged wood might seem too much of a hassle, there is a worth to it that transcends savings alone. Houses so old that they are not worth restoring were built during a time when people cared about a thing called quality. The grade of wood used then, even in interior studding, is the kind that's reserved for furniture-making today. It's rare to find a knot bigger than a pencil eraser, even in roof planking and subflooring, and, of course, you'll never have to worry about any of this wood warping or twisting with age.

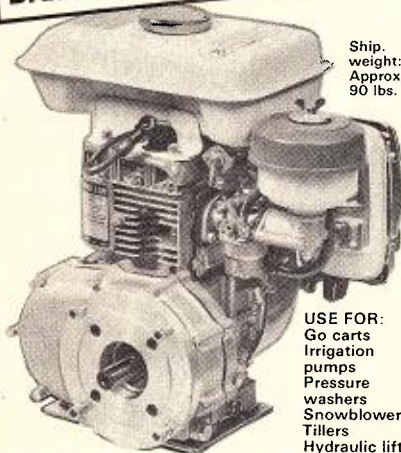
Low-cost lumber of some variety has found a place in every building on the Oleo Ranch, including our cabin. Working with it has proven to be no more difficult than more expensive wood. And the substantial savings realized are sure to please anyone else, who, like ourselves, prefers a cheaper spread. **MI**



"Oh, dear. Perhaps I shouldn't have waxed the tires!"

LIQUIDATION FAR BELOW DEALER COST! HONDA 4.5 hp. Gas Engines

Brand New! Factory Perfect!



Ship.
weight:
Approx.
90 lbs.

USE FOR:
Go carts
Irrigation
pumps
Pressure
washers
Snowblowers
Tillers
Hydraulic lift

- 2 to 1 gear reduction.
- 1700 rpm.
- Centrifugal clutch.
- Wet sump operation.

A sensational bargain! Famous Honda quality and Honda new engine warranty!

Almost double torque with 2 to 1 gear reduction. Four-cycle, air-cooled. Aluminum construction for less weight, faster heat dissipation. Engine silencer for noise reduction. Manual recoil start. 7/8" shaft with keyway. Oil bath air cleaner.

Our supply is very limited. We slashed the price way down low to sell out fast. Order NOW and save a big bundle of money!

Retail Value: \$349.00

OUT THEY GO AT ONLY:

\$148

INCLUDES ROLL-AWAY CART, TOO! A \$60 value! Yours FREE with engine. Sturdy steel tubing, chrome plated. Big 10 rubber wheels!



Credit card customers can phone orders.



Toll-Free: 800-328-5082

If busy signal, or after business hours, or if in Minnesota, call **800-228-2606** 24 hours a day, 7 days a week.

C.O.M.B. Co. / Liquidators Dept. B-471-5500
3258 Minnehaha Ave. / Minneapolis, MN 55406

Send _____ Honda 4.5 hp. engine(s) at \$148.00 ea. I will pay shipping charge to driver upon delivery. (Allow 3-4 weeks delivery. Add an extra 2 weeks if paid by check. Sorry, no C.O.D. orders.)

☐ My check or money order is enclosed.

Charge to: ☐ Mastercard ☐ VISA ☐ Am. Ex.

Acct. No. _____ Exp. _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____

Phone _____

Rural Route Customer: If truck carriers do not normally deliver to your home, include a note with this order stating nearest town address of store, friend, truck terminal where we can ship.

Minnesota residents add 4% state sales tax.

MUST LIQUIDATE AT BELOW DEALER COST! 2 hp. Metal, Brick, Concrete, Plastic CUT-OFF SAW

FACTORY NEW! FACTORY PERFECT!

- Cuts quickly through steel, iron, brass, copper, aluminum, zinc.*
- Zips easily through plastic and tile.*
- Cuts pipe, rods, tubing, bars, conduit, PVC, etc.
- Cuts fast, smooth with abrasive cutting wheel.

*Cutting wheel included for metal only.

Cuts stock up to 4" high and 5 1/2" wide. Miter cuts up to 45°

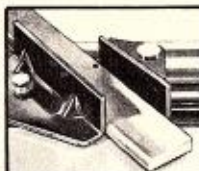
Here's a powerful 2 hp. saw that uses an abrasive cutting wheel to zip quickly, smoothly through your toughest cutting jobs!

When you have difficult stuff to cut... like hard steel... you need something really special to tackle the job. And THIS baby can do it! This fast action saw has all the guts and all the power you need to slice clean through hard metals in a hurry. This saw operates at 4000 rpm. on ordinary 115V house current. Standard arbor lets you switch to other standard abrasive wheels for special jobs. Uses 12" wheel with 1" hole.

SIX MONTH LIMITED WARRANTY



2 hp. MOTOR! Powerful motor operates cutting wheel at 4000 rpm. on 115V.



MITER CUTS! Vise adjusts easily for angle cuts up to 45°



CHAIN FASTENER! Locks saw head in down position for easy portability.



FINGERTIP CONTROL! On/off switch conveniently located by your thumb.

- Turnscrew vise can be securely angled for miter cuts up to 45°.
- Spring lever automatically keeps the saw head up-right when not in use.
- Strong, sturdy metal base with shock-absorbing feet at all four corners.
- Metal shield helps trap and deflect sparks that are produced in cutting operation.
- A convenient carrying strap makes it easy to pick up and carry the saw.
- 6 1/2-foot power cord with strong, rugged, 3-prong plug for grounding.
- Sturdy, solid construction. Fine quality. Designed for lasting durability.



Credit card customers can phone in order:

Toll-Free: 800-328-5082

If busy signal... or after business hours... or if calling from Minnesota, dial **800-228-2606** 24 hours a day, 7 days a week.

C.O.M.B. Co.

ONE OF THE NATION'S LARGEST
AUTHORIZED MAIL ORDER LIQUIDATORS
OF CONSUMER PRODUCTS

3258 MINNEHAHA AVENUE SOUTH
MINNEAPOLIS, MINN. 55406

PUBLIC NOTICE! BANKRUPTCY and Financially Distressed Merchandise!

We are authorized liquidators of large inventories that must be quickly sold at sacrifice prices because of a variety of reasons such as:

Manufacturers' overproduction
Last year's models
Bankruptcy
Sheriff's sale
Bank loan foreclosure
Insurance claim sale

If your company finds itself in any situation that requires it to sell large inventories for immediate cash, call us! Only products in perfect operating condition... or slight blemishes that do not affect operating performance... will be considered. Call toll-free: 800-328-5082.

Comparable retail:
\$269.00

OUT THEY GO AT ONLY:

\$168

C.O.M.B. Co. / Liquidators Dept. B-467-3110
3258 Minnehaha Ave. S., Minneapolis, Minn. 55406

Send _____ Cut-Off Saw(s) at \$168.00 each plus \$9.50 each for shipping and handling. (Allow up to 4-5 weeks for delivery. Add an extra 2 weeks if paid by check.) Sorry, no C.O.D. orders.

Minnesota residents add 4% state sales tax.

☐ My check or money order is enclosed.

Charge to: ☐ Mastercard ☐ VISA ☐ Am. Express

Acct. No. _____

Expires _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

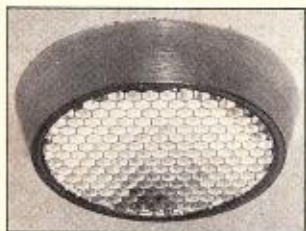
State _____ ZIP _____

Phone _____

Minnesota residents add 4% state sales tax.

THE ENERGY LINE

TUBE FIXTURE



One way to cut down on your electric bill is to replace incandescent bulbs with fluorescents wherever possible. An easy way to do that, at least where there are recessed-can fixtures in the ceiling, is to put in Conserv-Energy's (2626 Lacy St., Los Angeles, Calif.) screw-in fixture. The fluorescent light uses just 20 watts and is designed to replace a 75- or 150-watt flood. Just screw in the fixture, push it up, then turn it on. Comes in aluminum, white or gold finish.

GROUND ENERGY

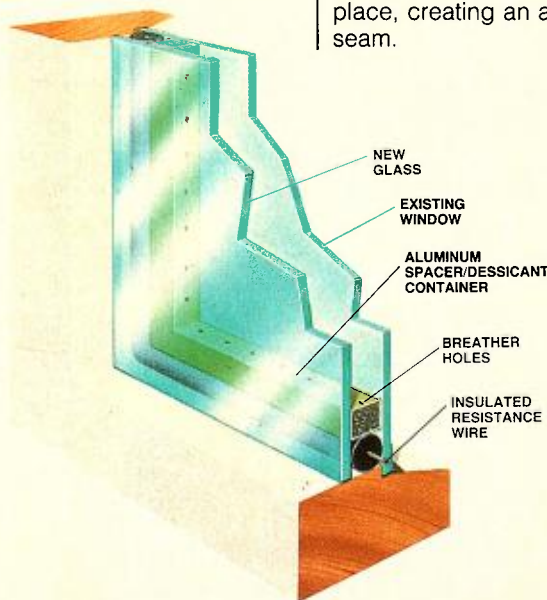
Everybody knows that the ground a few feet below the frost line stays at roughly the same temperature all year round. In the early part of the century, people made use of the phenomenon, conducting heat to the earth in summer, or from it in winter. The idea is being studied with renewed inter-

est these days. Battelle Labs is looking at ground-coil connected heat-pumps, for instance, to assess performance of pipe underground, how deep it is optimally buried and the best ways to lay it out. The study includes research on both old and new installations.

WINDOW MELT

One of the best ways to cut down on heat loss through a fixed single-pane window is to add another layer of glass, which can be an expensive proposition. You've got to rip out the old glass and stick in a sealed twin-pane unit or slap up a sheet of glass that almost always fogs because it isn't tightly stoppered. A new

idea comes from Energy Sealants, Inc., called Thermal Add-A-Pane. The idea is to use the existing glass and seal it by electrically melting a neoprene strip, interior to which is a desiccant, or moisture absorber. The seal goes around the perimeter of the window, followed by the desiccant strip, then the new glass. Inside the neoprene strip is a wire that connects to an electrical power supply. Current going through the wire melts the sealant into place, creating an airtight seam.



CRUSHER POWER

Nearly a third of the aluminum cans made in America last year started out as other forms of aluminum cans. That is, they were pro-



duced using aluminum from the country's 3,000 recycling centers. The rest went to landfills, or worse, onto roadside litter heaps. A new way to encourage people to recycle is here. It's called the Cangaroo, a machine placed in stores that takes cans from customers, counts and crushes them (the cans, not the patrons), then prints a receipt that can be used like money in the establishment—at a penny a can. Ninety days later the aluminum is likely to reappear as new cans filled with beer and soda. Recycling is profitable because it takes only 5 percent of the energy needed to produce aluminum from ore.—C.A.M. **MI**

INTRODUCING CHEVY LUV. NEWEST EVER. TOUGH AS EVER.

SLICK. TO CUT AIR DRAG. One look will tell you it's a different Chevy LUV: sleeker, sportier, with smoother lines.

36 26
EST. HWY. EPA EST. MPG (CITY)

THRIFTIEST LUV EVER.

All that new style and aerodynamics have paid off handsomely with LUV's best mileage estimates ever!

EFFICIENT 4WD.

LUV 4WD has the best standard-equipped 4x4 pick-up mileage estimates in the U.S.A.! Use estimated MPG for comparisons. Your mileage may differ depending on

31 22
EST. HWY. EPA EST. MPG (CITY)

speed, distance, weather. Mileage will be less in heavy city traffic. Actual highway mileage lower. Lower in California, where comparisons do not apply.

A Word About Engines: Chevy LUV engines are produced by Isuzu Motors Limited, Japan.



CHEVY LUV 4WD

NEW ROOM TO RELAX.

LUV's easier to get into and out of this year. Once you're inside you can enjoy the improved leg room, the rich new upholstery and trim, not to mention the new instrument panel and the new side window defoggers.

LONGEST BOX OF ANY SMALL PICKUP.

LUV's a hard worker, too. 2WD available with the longest cargo box in its class (7½ ft.!) And it'll hold more payload than any small half-tonner: 1680 lbs. including driver, passenger, equipment and cargo! See the all-new Chevy LUV at your Chevy dealer's, soon.

CHEVY LUV 2WD



**BUILT TOUGH.
BUILT FOR ECONOMY.**

AUTO ABCs

REPLACING BURNED-OUT BULBS

By Don Chaikin

ONE OF THE most frequently incorrect diagnoses the novice automotive do-it-yourselfer makes regards the directional signals. More often than not, the problem with nonworking directionals is simply a burned-out light bulb in one of the four corners of the car.

If the directionals flash properly for a turn in one direction but don't flash, or seem to flash only once, for a turn in the other (the dashboard warning arrow glows steadily instead of blinks), either the front or rear directional bulb on the nonworking side of the car is out. With the ignition on but engine off, turn on the directionals in the nonworking direction and check the front and rear signals. You'll find that one (though possibly both) is not lit. Replace that bulb to correct the problem.

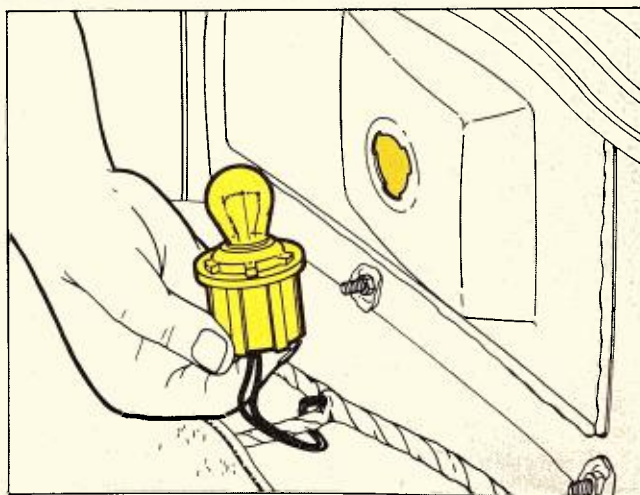
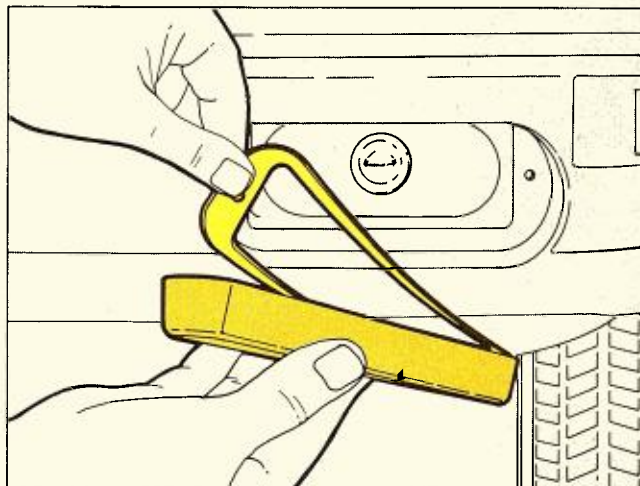
If all four directionals fail simultaneously, or if all the taillights or brake lights go out at the same time, chances are the problem is *not* a mass bulb burnout. But the burning out of a

single bulb, brake light, tail-light, parking light or directional is a fairly common occurrence—one that's inexpensive and simple to repair.

In many cars, the same bulb is used for the parking light or taillight as well as the directional or brake light. And it's possible that only one function will fail—the directional won't flash, but the parking light will glow. That's because the single bulb has two filaments in it, one for each function and either filament can burn out independently of the other. On other cars, there are individual, single-filament bulbs for each function.

To change the bulb, regardless of type, you have to gain access to it. That's generally done in one of two ways: from the front of the light fixture or from the back.

If the fixture's lens has two or more screws obviously holding it, undo the screws and carefully pop off the lens. There you'll find the bulb in its socket. If there is no obvious way to



Gaining access to brake-light, parking-light and directional-signal bulbs usually involves undoing a few screws through the light fixture's plastic lens. Be sure not to tear the gasket behind the lens (top). On some cars you have to remove the whole light fixture or a piece of trim molding (center) to get to the bulb and socket in the back of the fixture. If you don't see any obvious mounting screws through the fixture, look to the fixture's back, like in the trunk (bottom), for the bulb and socket.

**EVERYONE
NEEDS A LITTLE COMFORT.®**



There comes a time when we all want to sit back and get comfortable. And there's no better way than with the fine, easy taste of Southern Comfort.

Inspired in the 1800's in old New Orleans, this world famous liquor is delicious straight, on the rocks, or mixed any way you like it.

It's one of the real comforts of life.

**SOUTHERN
COMFORT**

Send gifts of Southern Comfort anywhere by phone. Call toll-free 800-528-6148 charge to major credit cards. Offer void in states where prohibited. Southern Comfort Corp., 80-100 Proof Liqueur, St. Louis, Mo. © 1980

get the lens off the fixture, go to the back of the fixture and you'll find wires going into a plastic socket. Remove the socket from the fixture and the bulb will come with the socket.

(Some cars have a combination: Undo screws through the lens and the whole fixture will come out. Then twist out the socket from the back of the fixture.)

The screws holding the lens generally are Phillips types. Carefully undo them. (If they're tight coming out, turn them back in partially, back them out, turn them in partially, back them out until all the way out.) Then gently pry the lens off the fixture. Be careful to not crack the plastic lens and don't tear its rubber gasket. Lay the screws, gasket and lens aside.

If there are no screws on the lens and it appears that the light fixture is a large piece to remove, check its back, either in the trunk or behind a bumper. (There might possibly be a panel held by tabs or screws covering the back of the fixture; undo them and remove or fold back the panel.) You'll find the plastic socket going into the back of the light fixture. Twist the plastic socket counterclockwise (leave its wires connected) and pull it out of the fixture. The bulb will be in the socket.

To remove the bulb itself from its socket, regardless of type of fixture, push in gently on the bulb and give it a slight counterclockwise turn. This unlocks the bulb. It will then pop slightly out and you can pull it straight out.

Before replacing the bulb, note whether it's a

single-filament or dual-filament bulb. Your owners' manual lists your car's bulb requirements, giving the universal trade code number for each bulb. Specify this number when you buy the replacement. It also doesn't hurt to carry the old bulb with you.

You see, not only can't a single-filament bulb do the job of a dual, it won't fit properly in its socket. The small tabs on the sides of the bulb's base are in slightly different spots on single- and dual-filament bulbs. Though the small tabs are placed 180° apart on both types of bulbs, on the single-filament bulb, they're both at the same distance from the bulb's bottom. On the dual-filament bulb, one of the tabs is closer to the bottom than the other. The notches in the fixture's socket correspond to the tabs on the bulb. A dual-filament bulb, therefore, can go into its socket in only one position.

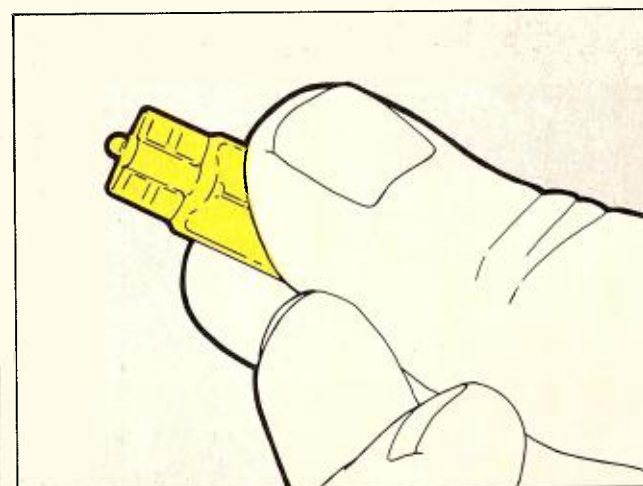
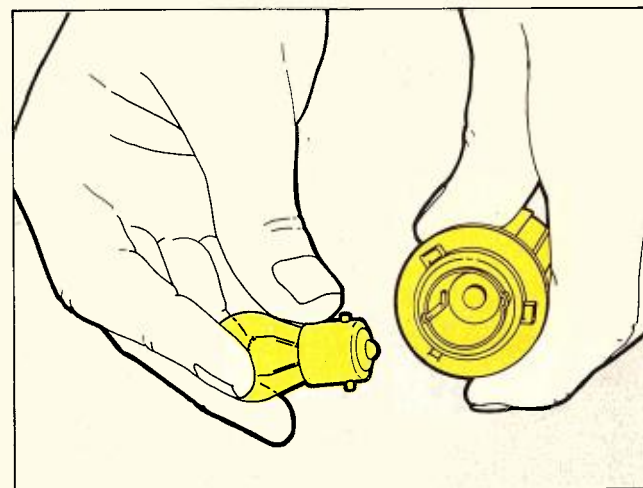
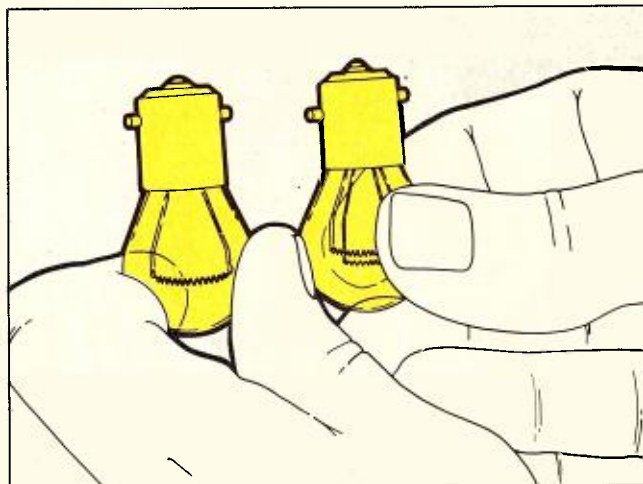
Putting the bulb in its socket is simply a matter of lining its tabs up with the socket's notches, pushing it all the way in and twisting it slightly clockwise. The bulb should lock in place. If not, you've either got the wrong type of bulb or a dual-filament bulb 180° out of position.

Before putting the new bulb in its socket, however, wipe the inside of the socket with a clean rag. If there's evidence of corrosion, clean the socket with electrical contact cleaner (available at electronics stores), then wipe it dry. In extreme cases, you might have to give the socket a light sanding. Make sure to clean it thoroughly after sanding.

Before replacing the fixture's lens, clean the inside of the lens. Make sure that the rubber gasket is in place around the edges of the lens before tightening the screws. But don't over-tighten the screws. You might crack the plastic

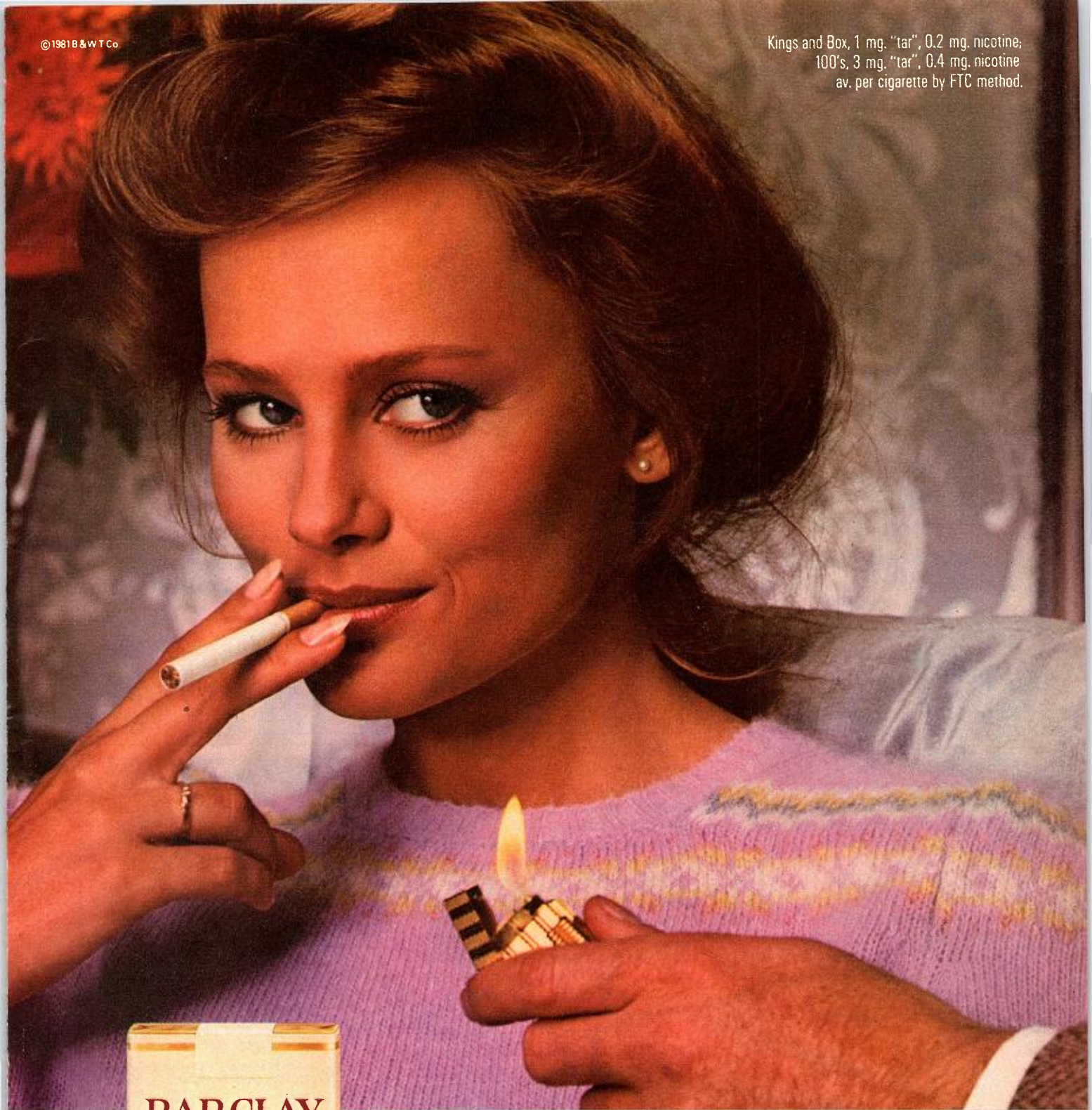
lens. Very easy to do.

Before replacing a socket in the back of a light fixture, make sure that the metal tab on the socket's shoulder is clean and corrosion free. Make sure that the metal surface it makes contact on (the back of the



Single- and dual-filament bulbs are not interchangeable. The small tabs on the dual-filament bulb's base are slightly offset from each other, while the single-filament bulb's tabs are exactly 180° apart (top). The tabs on the bulb's base (regardless of type) line up with grooves in the walls of the socket (center). Simply push the bulb in and twist it counterclockwise to lock it in place. Small side-marker bulbs may be of the spear type (bottom), which simply get pushed into their sockets.

Kings and Box, 1 mg. "tar", 0.2 mg. nicotine;
100's, 3 mg. "tar", 0.4 mg. nicotine
av. per cigarette by FTC method.



*99% tar free.*TM

Also available in 100's and Box

The pleasure is back.
BARCLAY

Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

K mart really cuts it— the grass and the price.

Groom your grass and save your green with a gutsy Topflight power mower by MTD, on sale now. These deluxe units combine outstanding features and rugged construction, making short work of your summer lawn chores for years to come. Mow down the cost of keeping up your lawn at more than 1,800

K mart stores
throughout
the U.S.A.

Both mowers include:

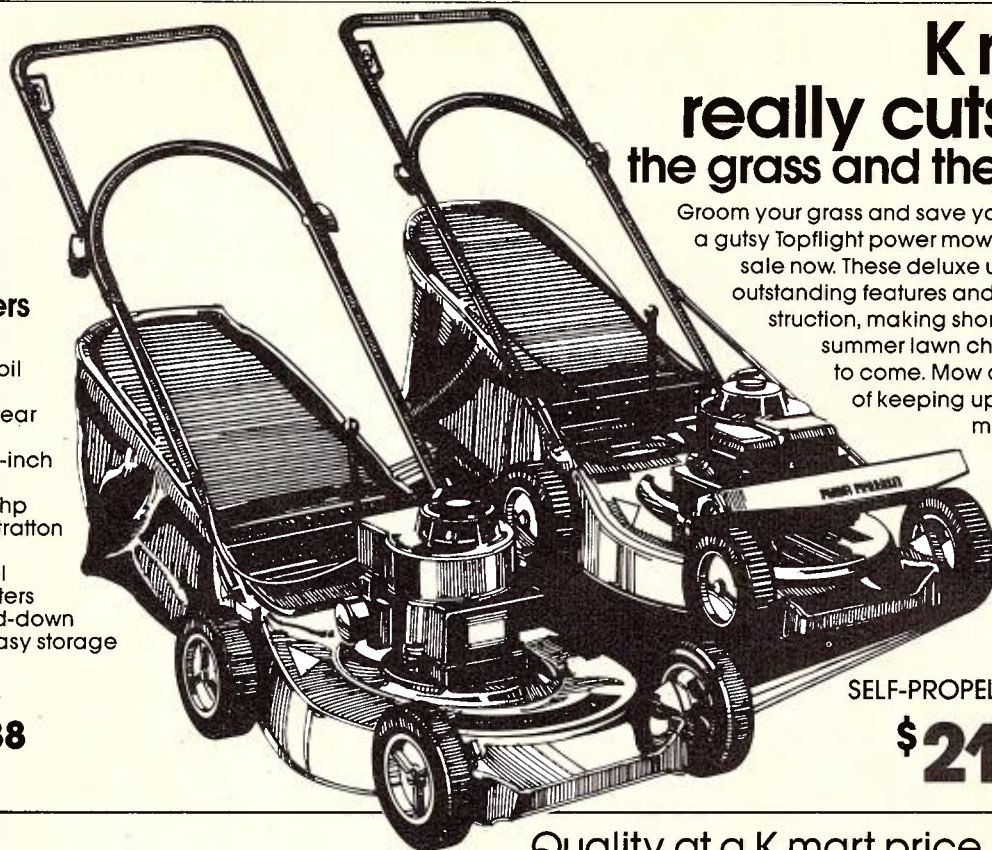
- Reliable recoil starter
- Convenient rear bagging
- Generous 20-inch swath
- Powerful 3½-hp Briggs and Stratton engine
- Handy wheel height adjusters
- Practical fold-down handle for easy storage

PUSH MODEL

\$169⁸⁸

SELF-PROPELLED MODEL

\$218⁸⁸



**ON SALE MAY 18
THROUGH MAY 30**

Quality at a K mart price. Nice.

Kmart
The Saving PlaceSM

light fixture) also is clean. A light sanding may be necessary. Then carefully align the tabs on the socket with the notches around the hole in the back of the fixture (the socket may go in only one way), push the socket in and twist it clockwise to lock it in place. Replace any trim panels.

Replacing side-marker light bulbs is done much the same way as for other lights except that the bulbs for the side markers can be small spear-type bulbs. They merely push straight into their sockets and are held by metal clips. To remove, simply pull straight out.

Regardless of type of bulb or light fixture, always change bulbs with the ignition off and all lights switched off to avoid blowing any fuses. And always be careful with bulbs—even a small one can give you a nasty cut if it breaks. **MI**

THE OLD BOMB

(Continued from page 24)

including a lot of important wiring and terminals. Periodic cleaning with an aerosol degreaser gets rid of the oil film. After it's off, spray ignition wiring with silicone. That keeps wiring clean (preventing deterioration from oil soaking) and keeps away moisture that can kill the ignition.

Short-trip driving is hell on spark plugs, so pull the plugs at least twice a year for inspection. Annual replacement on an older car still is important, even if you have one of the early electronic-ignition systems.

If your car has breaker points, the distributor cam may be irregularly worn. Use a special gapping procedure to prevent starting problems. Check the points gap with the rubbing block on each lobe. That way you know the difference in gap. So long as cam wear does not result in a difference of more than .007 inch between any two lobes, you should be okay. Set the gap on the least-worn lobe—the one that provides the largest gap—to the maximum specified by the carmaker. Then check the gap on the most-worn lobe. It should be at least .010 inch.

If you don't follow this procedure, and set the gap to specifications on a badly worn lobe, the gap will be too wide on lobes that are not badly worn. Starting may be difficult.

Some people become very attached to their old bombs. They spend money on everything from seat covers to bodywork. Forget about halfway measures. If the car has sentimental value, restore it and put it into easy service. Then find a car you can *really* regard as an old bomb, and treat it as such. **MI**



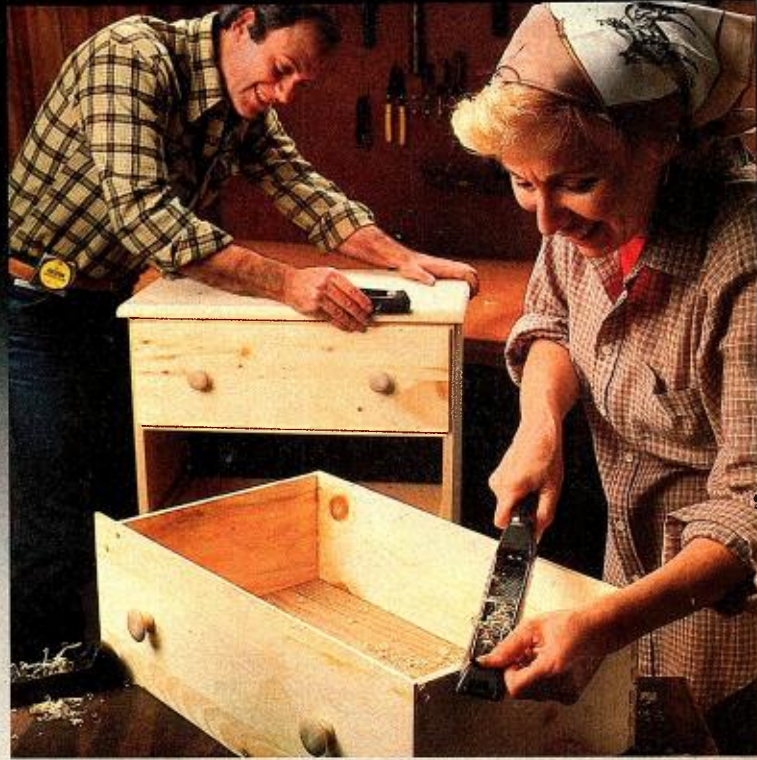
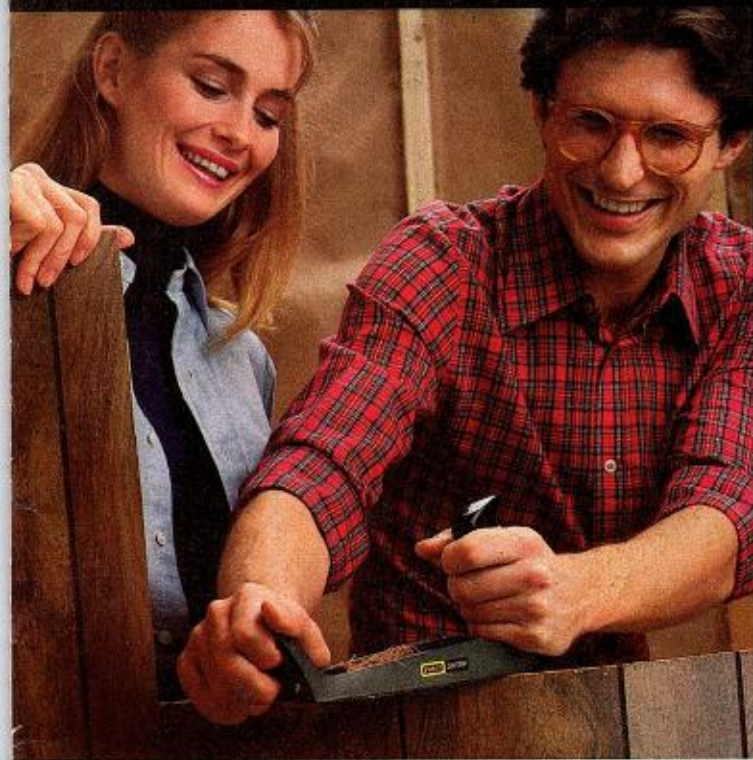
POSTER OFFER

For our April Home Improvement cover we asked noted cartoonist Jack Davis to use his imagination. The result—a parody of Grant Wood's *American Gothic*, perhaps more aptly called *American Blight*.

We were so enchanted with the results, we wanted to share it with our readers. But first, we asked Charles Osgood, CBS TV and radio commentator and author of *Nothing Could Be Finer Than a Crisis That Is Minor in the Morning*, to give our poster couple a voice in verse.

To order this 23×29-inch full-color reproduction (annotated with Osgood's poem, "Homeowner's Lament"), send a check or money order for \$4.50 plus \$.50 postage and handling for each poster ordered to: Mechanix Illustrated, c/o Hamilton House, P.O. Box MG, Dept. 2070, 32275 Mally Road, Madison Heights, MI. 48071.

HOW THE SUPER DOERS™ FINISH WHAT THEY START.



Stanley Surform® tools plane, shave, shape, file, smooth and finish what other tools start.

Super Doers of America™ are doing more...and finishing what they do with Surform Tools. The blades have hundreds of razor sharp steel teeth to finish anything from wood and wallboard to formica and aluminum. Even cut end grain! Blades never clog, never gouge the work.

Fast, easy, safe to use, for every member of the family. Plus—new carbide grit sanding blades that outlast sandpaper.

Now the Surform Finish Line™ has 23 tool-and-replaceable-blade combinations. Use one once, you'll never finish without them.

FREE!
Carbide Sanding Blade when you buy a Surform Plane or File. Look for this \$3.00 value on display in your store.



STANLEY®
helps you do things right.®

© 1981, Stanley Tools, Division of the Stanley Works
Super Doers of America and Super Doers are trademarks of Stanley Tools.

HENRY FORD COULDN'T BUILD THIS CAR— BUT YOU CAN!



**MiGi
by Fiberfab**

Not a mass produced Ford, but a detailed replicar of the '52 MG-TD. Complete kit package of precision-tooled components, authentic accessories. Uses VW chassis & engine, for optimal efficiency.

Build the MiGi now—enjoy driving it for years. For details:

Call Toll Free

1-800-328-5671.

Name _____	Age _____	City _____	State _____	Zip _____	Home Phone () _____	Business Phone () _____	Account No. _____	Expiration Date _____
Or mail to: FIBERFAB 1000 Turners Crossrd. Minneapolis, MN 55416 <input type="checkbox"/> Enclosed is \$2 for color brochure. <input type="checkbox"/> Enclosed is \$20 for assembly manual. Charge to my <input type="checkbox"/> VISA <input type="checkbox"/> American Express <input type="checkbox"/> Carte Blanche <input type="checkbox"/> MasterCard <input type="checkbox"/> Diners								

BOOK RACK

The Lemon Book by Ralph Nader, Clarence Ditlow and Joyce Kinnard. Caroline House Publishers, Inc., paperback, 236 pp. \$7.95.

This book is based on the premise that an industry as complex as the automobile industry is bound to produce its share of lemons. Its purpose, then, is to give hope to car-buyers, challenge the legal profession to take more interest in consumer (lemon) cases and push for basic reforms of law and remedies to protect the car-owner. *The Lemon Book* teaches you how not to get ripped off when you buy a car . . . and what to do if you get ripped off anyway.

By citing actual cases from embittered lemon-owners re-

ceived by the Center for Auto Safety, the book covers how to go about getting a defective vehicle repaired or replaced; how to get manufacturers and dealers to honor warranties; how to write letters of complaint; how to keep records; and how to take legal action.

The book tells you how to select a reliable car dealer, how to spot defects before buying and gives on-the-lot inspection tips for buying used. Warranties are explained and safety, gas consumption and auto emissions discussed.

The appendices of *The Lemon Book* list vital information for lemon-owners, including the names and addresses of consumer groups, company officials, politicians and government agencies. Small Claims

Court policies for each state (and Puerto Rico) are detailed in an easy-to-read chart.

Homeowner's Guide to Saving Energy by Billy L. Price and James T. Price. Tab Books, paperback, 384 pp. \$8.95.

For the do-it-yourselfer who wants to cut his heating, cooling and home-operating bills, this heavily illustrated guide contains easy-to-do instructions on every aspect of conserving energy.

The authors show how and where to install many types of insulation and include much-needed advice on how much insulation is too much. Modern, cost-efficient heat pumps are discussed in a comprehensive

guide to heating systems. The effects of humidity and how to control it, air circulation, heat loss and transfer and the relative cost-efficiency of various building materials are explained.

'The Prices give you the low-down on weather stripping, sealing and caulking and let you in on ways to economically operate air conditioners, kitchen appliances and hot-water heaters. A chapter on energy tax credits aims to save you even more money.

The book includes complete information on doing tune-ups, cleaning filters and accurately estimating fuel efficiency. There's a glossary of technical terms and an appendix to help you figure your home's energy conservation budget. **MI**

POLICE RADAR MEETS ITS MATCH.



Now with remote.

Developed by B.E.L. Laboratories after 12 years of research, the GUL Micro Scan car radar detector has repeatedly proven its superior signal sensitivity.

Thousands of users agree you need spend no more than \$95 to completely protect yourself.

Plenty of warning.

In separate tests conducted by Canadian Tire Corporation and *Motor Consumer Report*, the GUL demonstrated a detection distance significantly greater (on both X and K bands) than its top three competitors—the Fuzzbuster XK, the Whistler XK and the XK Snooper.

GUL won the *CB Magazine* com-

9.445 to 24.445 GHz). It successfully detects all police radar—including the new KR-11 short pulse.

The GUL has a nondirectional antenna; its large elliptical horn pulls in signals from front, side and rear. This 360° detection field maximizes sensitivity, providing you with valuable warnings—even when approaching hills and curves. *CB Magazine's* comparison bears this out: in a K band test for around-the-curve sensitivity, the GUL's detection range was double that of the Fuzzbuster and Super Snooper. And nearly three times greater than the highly regarded Whistler. On X band pickup from the side and behind, it was found to be the most effective detector in the dozen.

Doesn't cry "wolf."

The most common problem among radar detectors is the failure to screen out false signals, such as signals from taxis and ham radios, as well as hospital microwaves.

But the GUL shows no sign of falsing when exposed to radio signals of any kind. Its sophisticated circuitry is completely shielded by a diecast

aluminum case which protects the input terminals from stray signals. The aluminum provides lightness, along with durability not found in plastic casings.

A double warning system.

Both a tone and light come on in the presence of radar, and remain on until radar is gone. You're never lulled into a false sense of security by a tone that sounds only once. The tone is controlled with front-mounted on/off switch.

In addition, the GUL uses an internal voltage regulator, commutating filter, and synchronous detector to minimize power consumption. This also provides a more stable gain setting. And an automatic gain control has been added, for different city and country conditions.

Easy to install. Dash or remote.

The compact GUL measures only 4" x 3" x 4½". Its glare-free matte black case weighs just 20 oz. To mount, simply fasten the adhesive Velcro pad to the top of your dashboard; a matching velcro foot keeps the unit securely anchored—and allows for rapid removal. Just plug the unit into your cigarette lighter.

The GUL is also available in a \$129 under-the-hood remote model. Specially sealed to keep out moisture and extreme temperature, it installs in an hour with ordinary tools. 2" x 1" warning panel can be placed overhead or into the dash—so everything's neatly out of sight.

Try it yourself.

Order the GUL Micro Scan today. Road test it yourself. You'll find it the

finest electronic counter-intelligence you can own, or return it within 30 days for a courteous refund. The Sharper Image guarantees your satisfaction. Both models come complete with instructions and 120 day warranty.

30-DAY HOME TRIAL

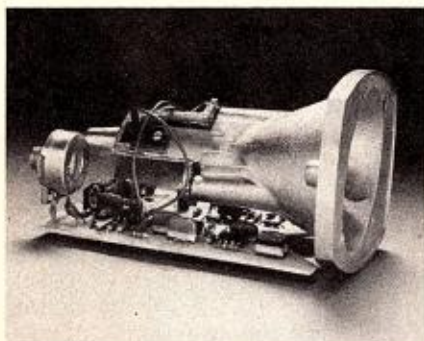
For dash mount, order product #131 for \$95. For new remote model, order #355 for \$129. Credit card holders may use our toll-free number below. Or send check for specified amount, plus \$2.50 delivery. Add 6% sales tax in California. And please mention this magazine.

800 227-3436

In California 800 622-0733

THE SHARPER IMAGE™

260 California St., San Francisco, CA 94111
(415) 788-8880 ©1981 The Sharper Image



Large elliptical horn antenna detects radar from all sides, even when approaching hills and curves.

parison, involving 12 leading detectors. Monitoring straight line detection, the GUL's 9,029 foot range topped the list.

Signals of .01 millionths of a volt are sufficient to trigger the GUL's scanning alert system (ranging from

THE WORLD OF SCIENCE

NEW NOVA

An exploding star has been discovered in the galaxy Fornax A, which is 50 million light years distant from the Milky Way. The rare astronomical event, otherwise known as a supernova, is not news to member stars of Fornax A, since the stellar burst, caused when the interior of a star collapses, occurred 50 million years ago. Because of the distance, it took these many millennia for the light, as great as the light emitted by all of the stars in the galaxy, to arrive at earth. Astronomers at Cerro Robles in Chile made the discovery. The event became more and more luminous as confirmations were made by other observatories. The Fornax A galaxy was formed by the collision of two galaxies.

SUB FLOATS

The Gulf Stream flows from Florida to Europe in a complicated network of warm currents that can be readily tracked on the surface, but not so readily at greater depths. A new technique, however—actually a refinement of an idea that was proposed during World War II—allows oceanographers to get data on the Stream that would not be available any other way. The process, devised by scientists at Woods Hole Oceanographic Institution, makes use of special floats, called SOFARs (for sound fixing and ranging), that can be sent to predetermined depths, remaining submerged to drift with the lower currents. The floats emit acoustical signals that

are picked up by surface tracking posts. The work brings one step closer a major goal: the ability to make periodic maps of the ocean currents, just as weathermen make maps of air currents.

DEPTH SURVEYOR

What do you get when you cross a metal detector with a radar antenna? You get a geophysical survey machine. At the Pacific Northwest Laboratory, researchers have built a mobile version of the system that can travel over an area to provide data to a mapping computer, which details subsurface areas down to 20 feet. The setup has already been used to locate radioactive waste, buried toxic chemicals and munitions that were dumped and forgotten. The researchers claim it can be used, too, to find underground pipelines, bedrock or water tables. As the device rolls over an area, the radar picks up reflected signals from underground objects, while a magnetometer detects changes in the earth's magnetic field caused by the objects' magnetic properties. The computer converts the data to images, which can be read out in either cross-sectional or overhead views.

CABLE VAPOR

One of the problems of using optical fibers to carry laser-beam communications is that some wavelengths of light traverse the fibers faster than others, resulting in a distortion of the signal over long distances. Now researchers at IBM have come up with a way to compensate for the disparity. By using a vapor of sodium, they're able to compress pulses of light after they have lengthened. In glass, longer wavelengths of light move faster than shorter ones, while in sodium vapor, the opposite is true. By rigging a vapor cell of the right length to a fiber cable, scientists can compress pulses of light that lengthen after traveling through extended fibers, eliminating the distortion.

tion of the signal over long distances. Now researchers at IBM have come up with a way to compensate for the disparity. By using a vapor of sodium, they're able to compress pulses of light after they have lengthened. In glass, longer wavelengths of light move faster than shorter ones, while in sodium vapor, the opposite is true. By rigging a vapor cell of the right length to a fiber cable, scientists can compress pulses of light that lengthen after traveling through extended fibers, eliminating the distortion.

ROBOT EYES

One of the great things about the human body is that it can manipulate objects, orienting them in any desired fashion. A simple task? For humans, yes, but for the current generations of robots, no—though engineers are getting close. A new robot developed at the University of Rhode Island can perform some of the jobs a human can, thanks to a setup that includes two television cameras harnessed to a computer. Actually it's the first gadget of its ilk that can efficiently take things from a bin, orient them, then transport and place them in a desired location, using a kind of vision, or what amounts to vision in a robot. The system consists of an arm, a gripper, a wrist and the TV subsystem. One camera is mounted so it can see the bin, the other so it can estimate the orientation of whatever is being manipulated. As well as the robot does the job, a human can still do it five times faster.

PILOT SLEEP

Ever wonder if the guy flying the plane up front got enough sleep last night? After all, one of his major occupational hazards is jet lag—or circadian desynchronization, as it's termed by sleep scientists. Although a lot of research has been conducted on sleep cycles in shift workers, truckers, ship crews and the like, there's not much information on the effect of changes of biological rhythms in airline crews. NASA is trying to make some determination of such effects on airline pilots. Among other things, scientists plan to study sleep patterns of crews, making use of NASA's various simulation facilities. They'll try to develop ways to avoid, or at least counteract, the consequences of lost sleep and discover limits of sleeplessness, beyond which performance may become hazardous.

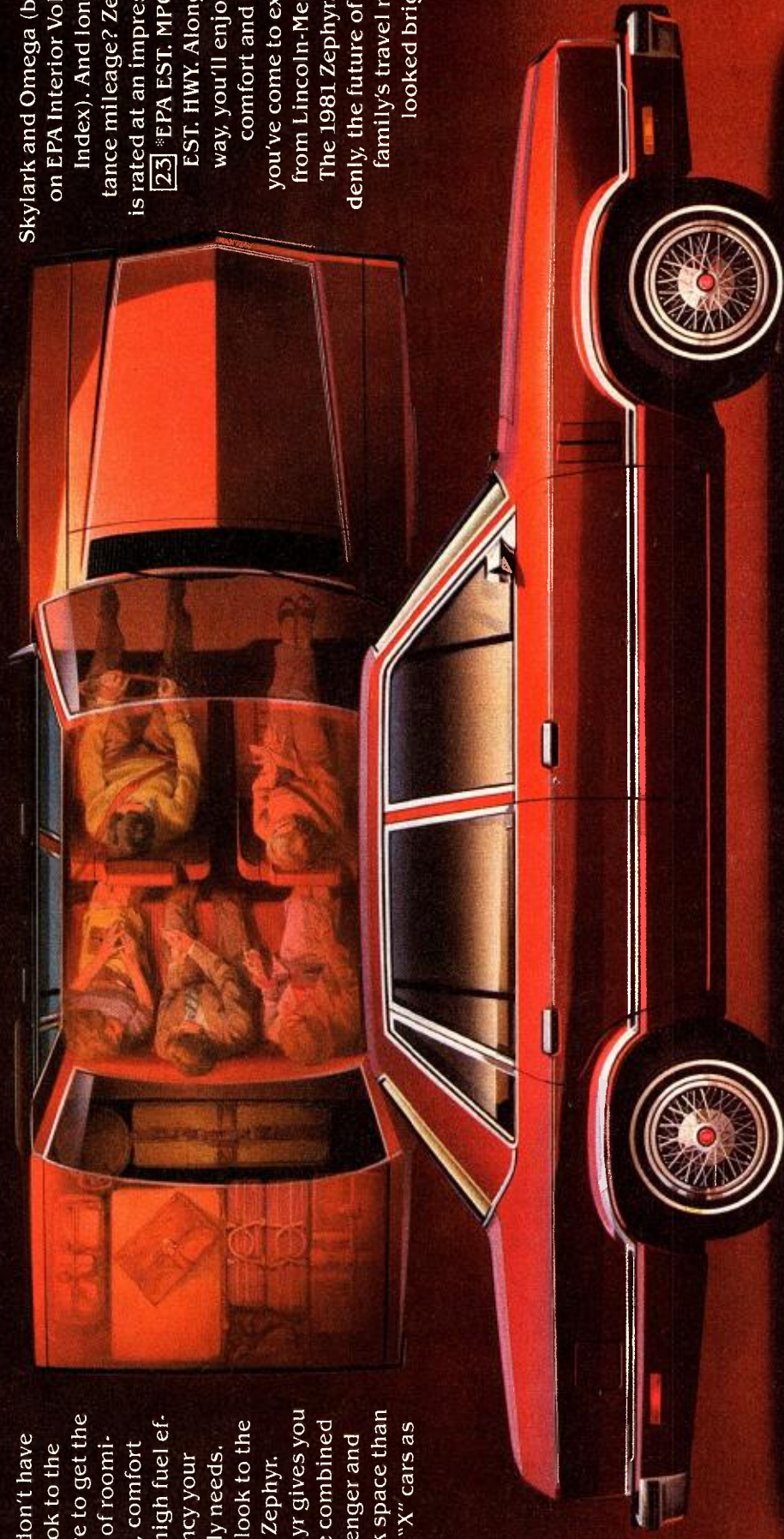
NO-SCRATCH LENS

One of the problems with plastic-lens eyeglasses is that the lenses often get scratched easily, sometimes just by cleaning them. But a way to harden lenses against that comes in a new product from 3M. It's called Armorlite RLX, newly available for both bifocal and single-vision correction. The RLX lenses can be tinted, come in any size and are nearly twenty times more scratch-resistant than regular plastic lenses, claims the company. Cost is about \$15 extra.—C.A.M.

SPACE TRAVEL

You don't have to look to the future to get the kind of roominess, comfort and high fuel efficiency your family needs. Just look to the 1981 Zephyr. Zephyr gives you more combined passenger and trunk space than such "X" cars as

Skylark and Omega (based on EPA Interior Volume Index). And long distance mileage? Zephyr is rated at an impressive **23** *EPA EST. MPG, 34 EST. HWY. Along the way, you'll enjoy the comfort and style you've come to expect from Lincoln-Mercury. The 1981 Zephyr. Suddenly, the future of your family's travel never looked brighter.



ZEPHYR
LINCOLN-MERCURY DIVISION



ZEPHYR FROM LINCOLN-MERCURY

*Compare to estimated MPG of other cars. Your mileage may differ depending on speed, weather conditions, and trip length. Actual highway mileage and California ratings lower. Buy or lease at your Lincoln-Mercury Dealer's.

Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

5 mg. "tar", 0.4 mg. nicotine av. per cigarette, FTC Report Jan. 1980.

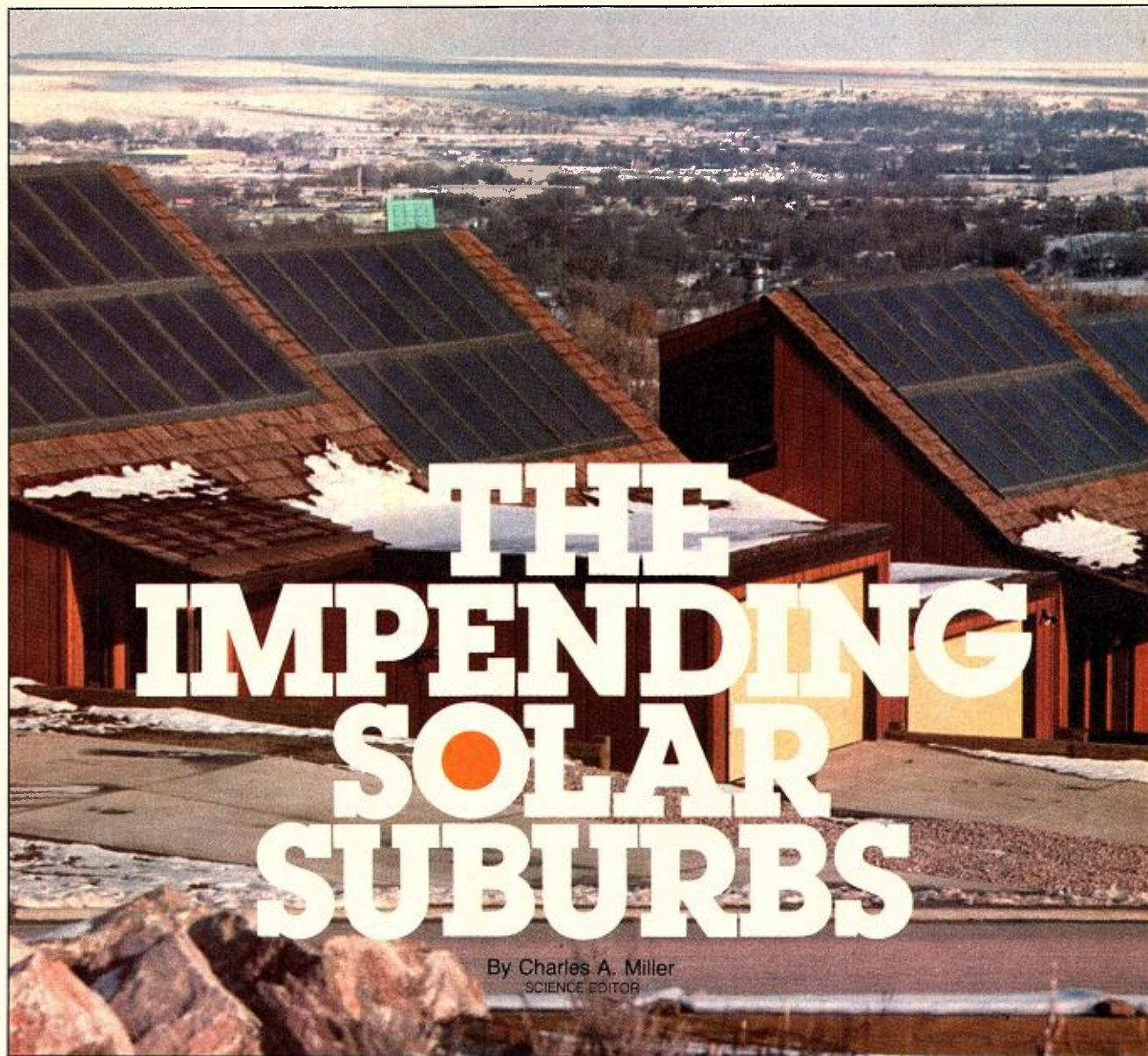
Taste True's improved taste.



Still only

5
MG TAR

Ultra low tar never tasted so good.



THE FIRST American solar houses built centuries ago by Indians of the Southwest have their modern-day counterparts in suburban areas all over the country, thanks to developers keen on marketing houses that appeal to energy-conscious buyers—and, conversely, to home buyers that insist on houses that cost less to run.

What are today's solar developments like? The first thing you're likely to notice about any of them is that all the streets run east and west. They don't differ radically in appearance from conventional developments. And in the ones going up now, which may presage things to come, the houses are mostly set up for passive solar, with active do-

mestic hot-water systems offered as an option.

One of the reasons active systems don't abound in the new solar neighborhoods is that the cost of active systems, which can add 30 percent to the cost of a house, is not economically justifiable. A good passive design may add no more than 2 percent to a new home's cost.

In a good year, there are roughly 2 million new homes built. According to projections by the National Association of Home Builders, within the next five to six years, one-fourth of all new houses will be built using passive solar technology—some 500,000 houses each year.

Why? Because most builders, those that are consistently success-

ful in marketing housing, are primarily businessmen, interested in one thing: selling a house. With the expected rise in energy costs, they're anticipating crowds of people who want houses that are cheap to run.

Another situation that may further the rise in solar housing projects is that banks may soon include the cost of energy needed by a house when determining whether to grant a loan. After all, a person living in a building that doesn't cost a lot to heat or cool is going to have more money available to pay the mortgage bill. It follows that energy costs could be a factor for bankers when they determine the amount of the loan.

How are builders of all-solar developments faring? That story has a plot that runs from builders being able to sell every solar house put up to others not being able to sell a single one. Many would-be solar developers are laying back, using the current building slump to ready themselves for what they see as a

burgeoning market in the future. Most agree that by building and marketing solar houses, they can get a competitive edge on other builders in their area.

Some see a big gamble. There still are a lot of potential home buyers who have not followed innovations in solar technology, nor even

know what basic terms, such as *passive solar*, mean. Buyers may not realize that there are solar solutions to energy problems—solutions proven to reduce the cost of operating a house. When going out on the market, they're not sure of the right questions to ask or are confused by the torrent of solar information



flooded on them from virtually all standpoints—from “now is the time” to “solar power is twenty years away.”

All of that matters little for the present because many people *are* buying, but, surprisingly, not simply because a house is solar. People buy because the neighborhood of solar houses is near where they work, or near a school where they want their kids to go, or because they think the house is a good value and has the kind of floor plan they want in a house. Because, in other words, of all the considerations that go into any home-buying decision, which are still very much in play when a buyer is looking at solar homes.

Is now a good time to go out and buy a home in a solar subdivision? It all depends on the house. If you can find a house that makes use of the sun without a lot of complexity and one that makes full use of conservation techniques—yes. With those two ideas going for it, the house can be up to 70 percent more efficient than a house that was built five years ago. And, as a practical matter, energy-saving houses are likely to be a better investment, not to mention easier to resell.

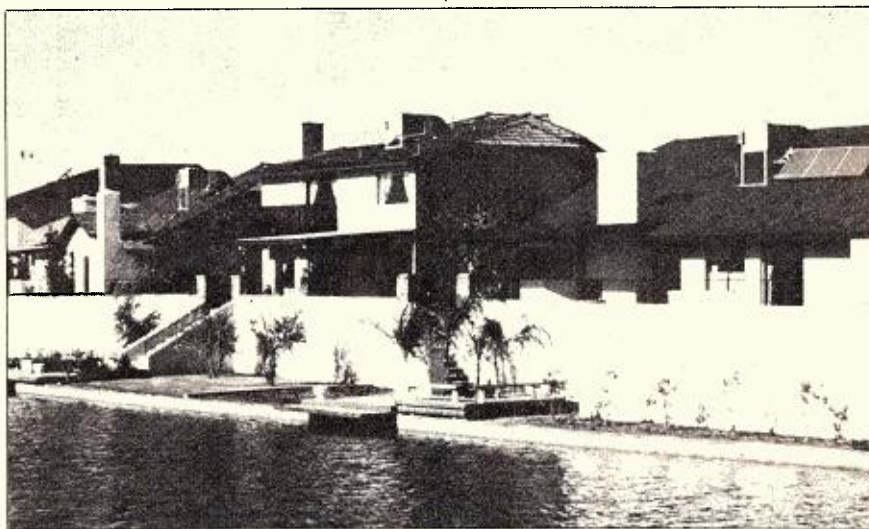
Not every solar housing development is a success story. Just building a solar home doesn't bring the world on freshly beaten paths to a builder's door. In some areas there are no anxious multitudes willing to make an investment in something untried, or perceived as such. The builder in Georgia who built 25 solar homes in one development, then nearly went bust trying to market them, can testify to that. He didn't realize the amount of money and effort necessary to educate a reluctant populace on the merits of buying solar, or the time it would take to overcome buyers' fears of being stuck with something that might not work—though the homes he built, in fact, work quite well. He thinks he might give it a go again, but not until area utility bills edge upward, hoping people will then feel *compelled* to buy more efficient houses.

Another reason that solar homes might not sell is that the builders have a bad site to start off with. They build solar homes, then blame the fact that they didn't move on the technology, when the house probably would not have sold in the first place.

What kind of people buy solar homes in solar housing developments? According to a HUD study, buyers are not that much different, though many are people who have owned a house before, typically in the same town, and are more than passingly concerned about the cost of running a house. They may have

that make use of skylights to those with thermal storage in tiled patios. The houses are built on slabs and range up to 2,500 square feet in size. The landscaping includes numerous deciduous trees on neighborhood greenspaces, cultivated by the residents.

In Richmond, Virginia, a subdivi-



Solar suburbs that may be models for the future. Facing page: Aerial view of Davis, California, a suburban area with combinations of solar technology, from Trombe walls to concentrating collectors, everywhere installed. Above: A view of a Continental Homes development in Phoenix, Arizona, notable for not looking solar.

a trifle more education and income but not to any great degree.

The real hotbeds of solar activity are, as might be expected, Sunbelt states. The leader is California, where there are well over a hundred such developments in place and more on the way. Arizona and Florida are vying for second place, but there are also solar home plots in places such as Lincoln, Nebraska, and Canton, Ohio.

Here is a look at some developments in solar living across the country:

In Davis, California, a town noteworthy for its active support of solar, a development called Village Homes includes 217 solar homes which are laid out in east-west orientation. The houses are not overly modernistic, characterized mostly by solid passive design: light-colored walls, broad overhangs and plenty of glazing on the south side. Solar functions vary from houses

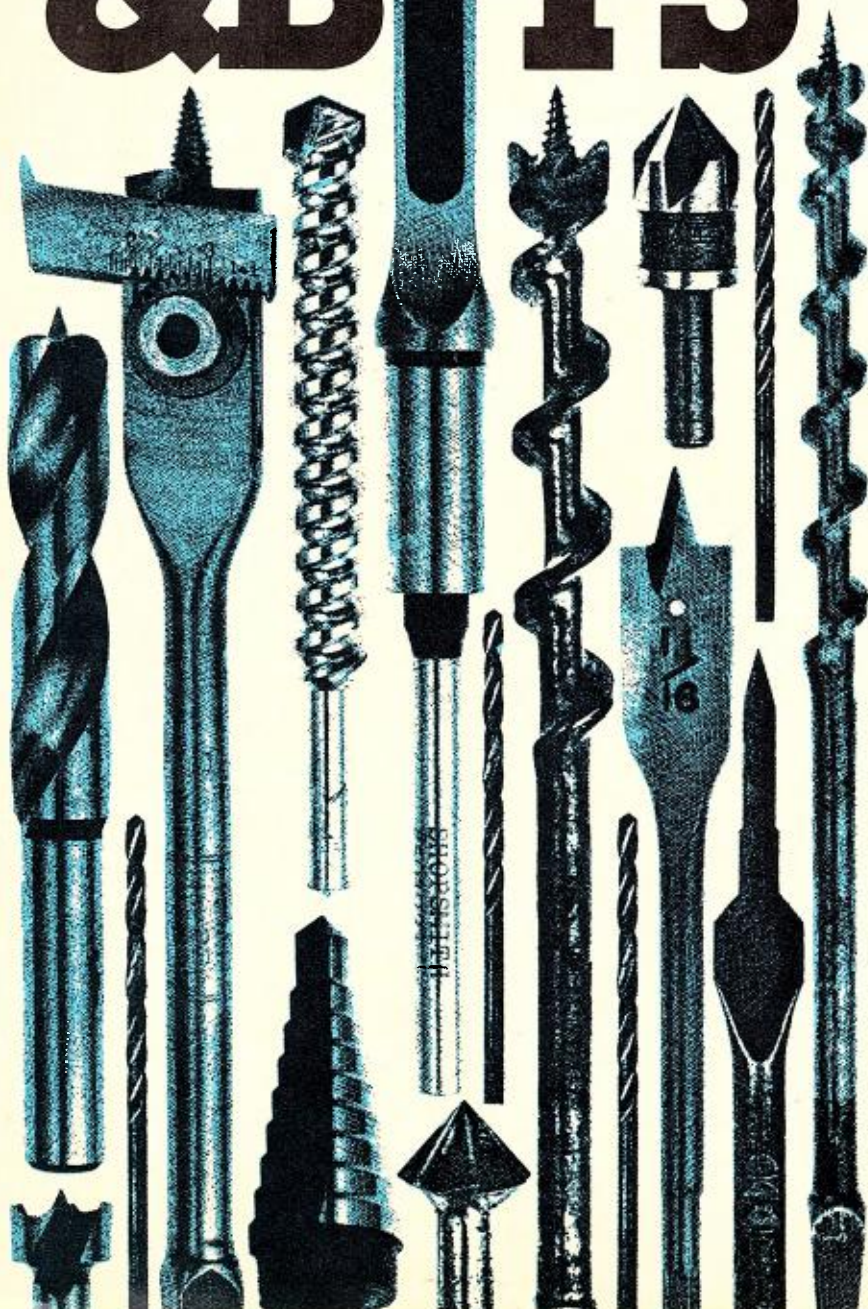
sion of some 213 solar homes is going up. When complete, each house will have ceilings insulated to R-30 and walls to R-22. There is to be a 30-foot sunspace on the south side of each house, along with a mass, or Trombe, wall that extends to the roof to store heat for use when the sun isn't shining.

In the Phoenix area there are 20 solar developments built by Continental Homes, located throughout the valley. One of the newer ones features, as standard, a solar hot-water system with an 85 gallon tank, R-30 ceilings, R-13 walls and an electric heat pump. Prices range, for all of Continental's houses, from \$47,000 to \$160,000.

In Boulder, Colorado, a project called Winding Trails Village features houses with an integral greenhouse (with brick floor for heat storage) and an air-lock entry. Insulation includes R-19 walls, R-30 ceilings and an R-9 foundation. In summer, doors open to the greenhouse to allow night air to drop to the bedroom levels. Backup heat in winter comes from waste heat of a gas water heater. A digital thermometer in the kitchen reads out the temperature of the greenhouse, heat storage and indoor and outdoor ambients. **MI**

By Thomas H. Jones

SORTING OUT SPECIALIZED DRILLS & BITS



DRILLS and bits, more so than the power heads that drive them, are a related family of types and sizes. Some are general, some are specialized, some are used in combinations. An understanding of them all is essential to improving tool skills.

A good look at the family tree of drills and bits explains them quickly—and this we have endeavored to do with the eight sorted groups depicted here. They range from basic to specialized, with emphasis on the latter. And the how and why of their designs and performance characteristics is fascinating, as well as vital, information for getting ahead in woodworking.

Basic drills. For repairs around the house, putting up shelves, rough carpentry and most home-improvement work, three inexpensive types of drills can handle 99 percent of your drilling: twist drills, for small holes in wood, metal and some plastics; spade drills, for larger holes in wood; and carbide-tip drills, for holes in masonry. If you have a brace, you can add auger bits for larger holes in wood.

There are times when you have to do drilling beyond the capability of these basic drills. You may have to drill quite large holes, more accurate holes, cleaner holes. At these times, you can choose from a wide range of specialized drills. And in several cases there is more than one type of drill for the same job.

Straight drilling in wood. The flat at the tip of a twist drill allows the drill to walk on the work surface before starting the hole. You must countersink a pilot hole (just punching it doesn't always work) for the drill first. A twist drill also tends to wander in deep holes because its drilled direction is easily influenced by hard/soft variations in the wood—even when the drill is chucked in a drill press.

A spade drill can be accurately started with its pointed pilot, but these drills also tend to wander in deep holes. An auger bit in a brace drills a straight, precisely located hole, but you have to aim the drill to keep it going straight. And that takes experience.

Wood bit. Wood-boring bit. Brad-point drill. Center-spur locator bit. Many names, but they are all the same bit. The brad-point's tip starts

the hole where it is supposed to be and keeps it from wandering afterward. The two side spurs slice through the wood leaving a clean hole while its sharp flutes shave out the wood.

The brad-point bit is the best bit for making clean, accurate holes in wood. It is for use in wood only.

The Forstner bit is a rather expensive bit that can handle some tricky drilling problems. It drills an exceptionally clean hole (cleaner than any of the other bits) with a flat bottom. A flat-bottom hole is im-

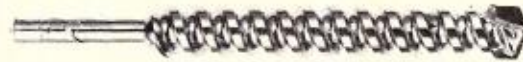
BASIC DRILLS



Twist Drill



Spade Drill

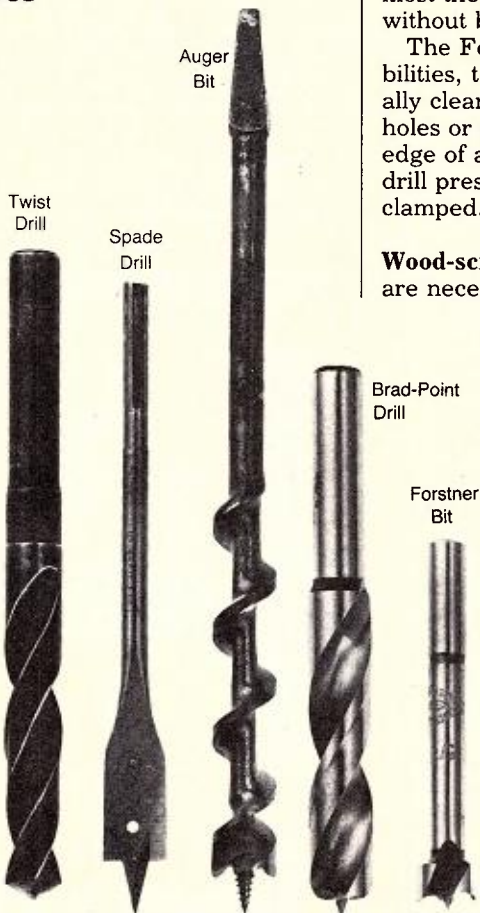


Carbide-Tip Masonry Drill



Auger Bit

STRAIGHT DRILLING IN WOOD



Auger Bit

Twist Drill

Spade Drill

Brad-Point Drill

Forstner Bit

Hole Profiles

portant when drilling dowel holes in the sides of boards; you can drill almost the full thickness of the board without breaking through.

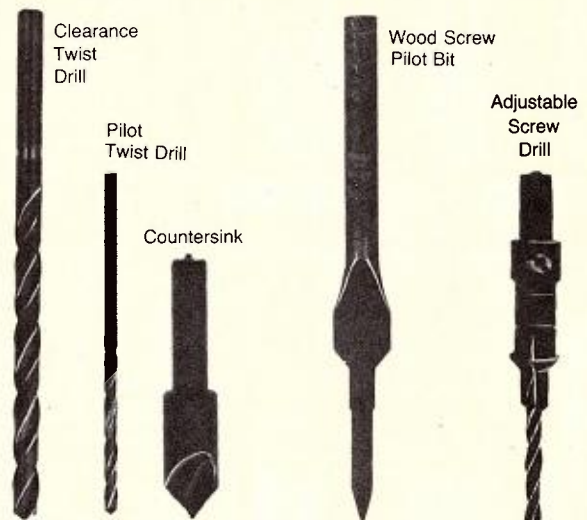
The Forstner bit has other capabilities, too. You can drill exceptionally clean angled holes, overlapping holes or semicircular holes in the edge of a board. You must use a drill press and the work should be clamped.

Wood-screw pilot holes. Pilot holes are necessary to avoid splitting the

wood with the screw and to enable the screw to cut deep threads in the wood, thus giving the screw holding power. The most accurate way to make the pilot hole is with three separate drills: one sized for the shank, one for the screw threads and a countersink to seat the head (if the screw has a flat head).

A set of wood-screw pilot bits offers a convenient solution. Each bit counterbores and countersinks a hole for a specific length and diameter screw. However, each bit in

WOOD SCREW PILOT HOLES



Clearance Twist Drill

Pilot Twist Drill

Countersink

Wood Screw Pilot Bit

Adjustable Screw Drill

Hole Profiles

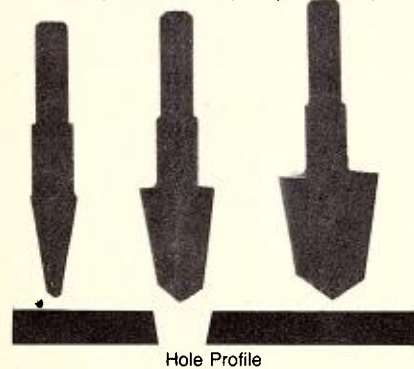
these sets is usually marked for two screw diameters (4-5, 6-7, 8-9, 10-12). It is physically impossible for a bit of one diameter to make proper pilot holes for two screw diameters. Furthermore, the bit making the hole for the threaded portion of the wood screw is oversize—with the result that screws are more likely to strip in the hole, rather than hold.

A set of adjustable screw-drills for screw sizes 6, 8, 10 and 12 are not quite as convenient. You have to adjust the drill to match the length of the screw, but you do get the correct pilot hole for the screw. You do not always get the shank hole to the correct depth, however.

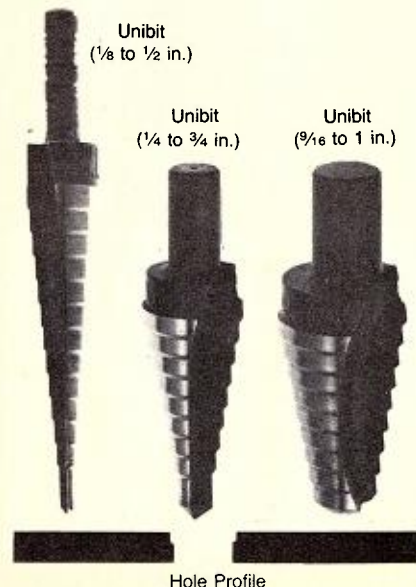
Wood-screw pilot bits and adjustable screw-drills offer speed in drilling pilot holes for wood screws. If you want maximum screw-holding power, you have to make your holes the hard way with two twist drills and a countersink.

MULTIDIAMETER DRILLS

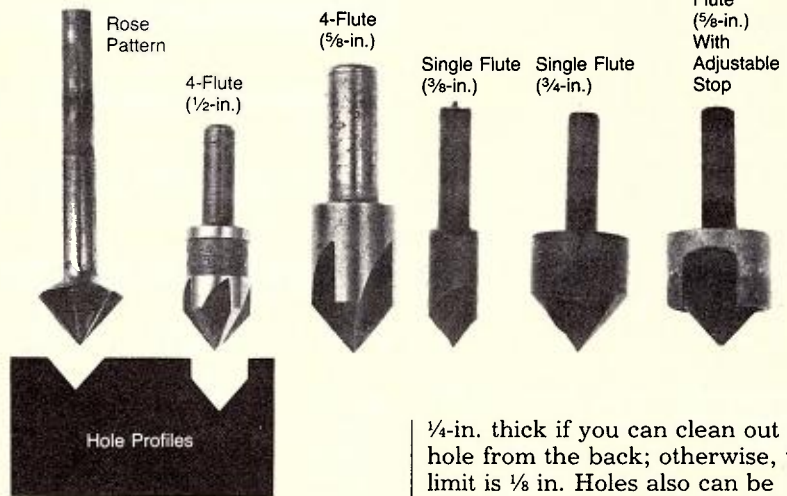
Multi-Drill (1/8 to 3/8 in.) Multi-Drill (5/16 to 9/16 in.) Multi-Drill (1/2 to 3/4 in.)



UNIBITS



COUNTERSINKS



Countersinks. Countersinks are used to make tapered holes to seat flathead wood screws, to chamfer the lip of the hole for neatness, to ease the insertion of a bolt and to produce tighter dowel joints. Types are made for both power drills and hand braces. All countersinks except the rose pattern type can be run below the work surface to allow plugging the hole over the screw's head.

Multidiameter drills. Drilling holes in metal, plastics and thin wood in diameters up to 1 in. can be done with an expensive collection of twist drills—or you can use drills that are capable of drilling multidiameter holes.

Arco multidrills are single-flute tapered drills. A set of three makes any size hole from 1/8 in. to 3/4 in. However, the hole will not be a perfect round. And to drill repeat holes of the same diameter, the drilling has to be done on a drill press with a depth gauge.

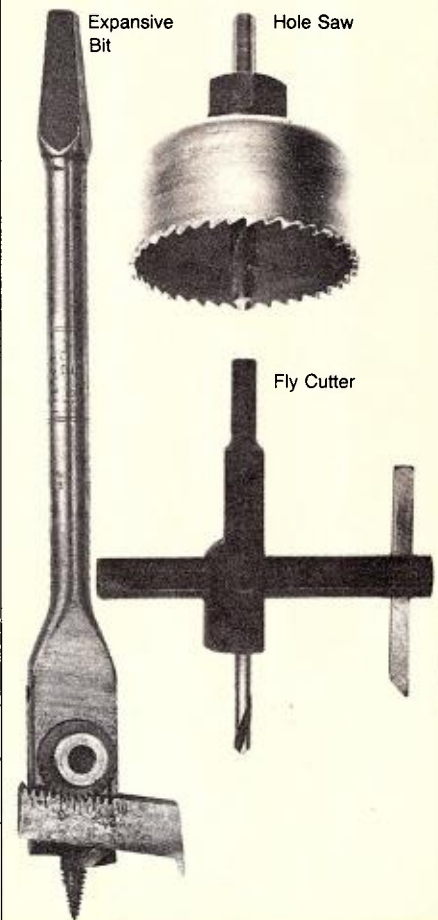
Unibits. The Unibit is a different and better approach to the same problem. It is a step drill. The smallest size drills holes from 1/8 in. to 1/2 in., in 1/32-in. increments. Larger sizes drill holes from 1/4 in. to 3/4 in. and from 9/16 in. to 1 in., each in 1/16-in. increments. The small drill requires neither a starting hole or punch mark; the larger drills require starting holes.

Repeat holes of the same diameter can be drilled by counting the steps as you go in. Straight-side holes can be made in material up to

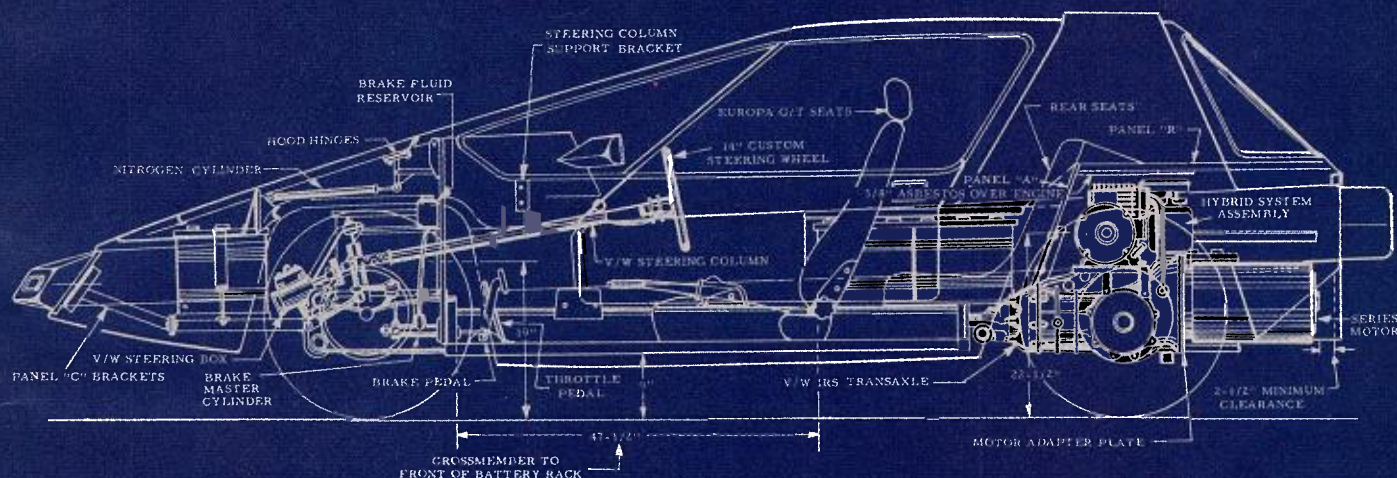
1/4-in. thick if you can clean out the hole from the back; otherwise, the limit is 1/8 in. Holes also can be slightly chamfered with the Unibit by carefully using the shoulder of the next-larger-diameter segment.

Large-diameter bits. There are drills for making large holes in wood and metal and include the ex-
(Continued on page 132)

LARGE-DIAMETER BITS



MECHANIX ILLUSTRATED'S URBA TOWN CAR. BUILD IT YOURSELF AND SEE FOR YOURSELF.



Introducing the 1981 Urba Town Car, MI's remarkable contribution to automotive progress.

See for yourself why engineers and mechanics are calling it the design of the future. By transforming the chassis of an old VW Beetle into this sleek hybrid electric, you can seat up to four adults in the Urba Town Car. Log over 65 miles in one battery charge. Or go even further with an on-board generator.

See too how handy we've made it for you. You get a complete kit with plans and specs from MI (twelve 17" x 22" to-scale construction drawings, plus a fully-illustrated 72-page plans book). In addition, MI's engineers

have included a parts listing that tells you where to find the components you need, along with tips on how to get them at the lowest possible price. Best of all, you'll quickly see why the Urba Town Car makes sense as a low-cost, economical alternative for the man who prefers to do it himself.

Send now for your kit to construct this daring design. It may be the best plans you ever made.

Enclose \$17 in check or money order to MI Plans Service, P.O. Box MG/Dept. 2060, 32275 Mally Road, Madison Heights, MI 48071. MI guarantees a full refund within 30 days if you are not completely satisfied.

Please print.

Send \$17.00 in check or money order (no cash, please!) to: Mechanix Illustrated Plans Service, P.O. Box MG/Dept. 2060, 32275 Mally Road, Madison Heights, MI 48071.

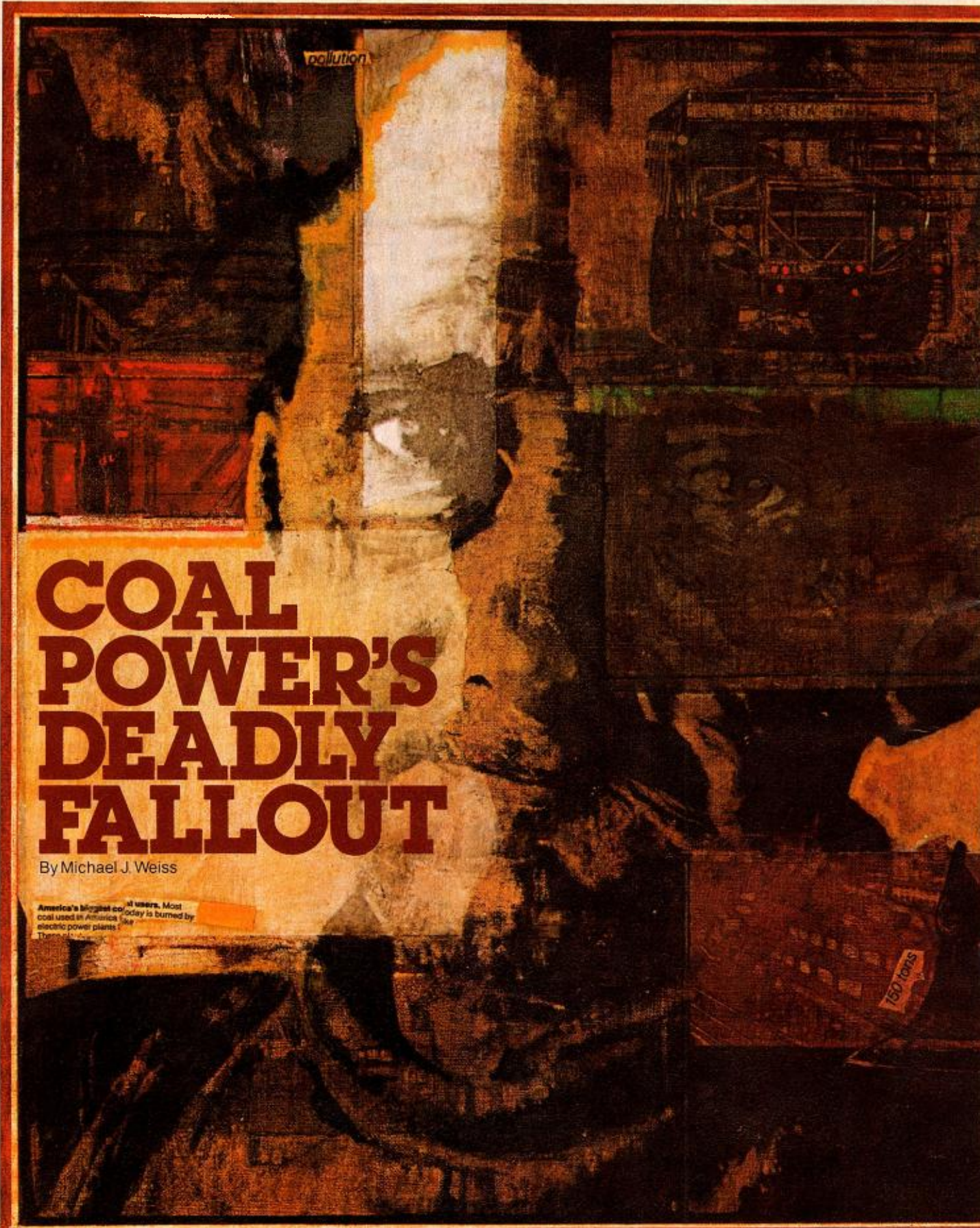
I have enclosed \$_____ for _____ set(s) of Urba Town Car Plans.

Name _____

Address _____

City, State, Zip _____

Allow 4-6 weeks for delivery.




pollution

COAL POWER'S DEADLY FALLOUT

By Michael J. Weiss

America's biggest coal users. Most coal used in America today is burned by electric power plants.

150 tons



SHIFT TO COAL. Ever since oil prices became something to be watched daily, that whisper has persisted. Indeed, coal has been touted as an energy panacea—the fuel that can cut the country's debilitating reliance on expensive foreign oil.

Some forecasts hold that without relying on technological innovations, the amount of coal which can be mined and burned could double by the end of the century. That certainly gives coal a decided edge over the inchoate synthetic-fuels program. And since the U.S. has immense coal reserves that can be exploited easily, it looks as if the country will make that shift.

Unfortunately, coal use generates deadly fallout. As more coal is burned, air throughout the country will get noticeably dirtier. To extract new reserves, great sections of the landscape will be scarred by strip mines. Increased coal use could affect weather patterns and breed new forms of pollution such as acid rain. There's no way around it. There will be specific trade-offs taken during the shift to coal power.

"We cannot use one billion tons of coal a year without harming our environment," concludes a recent General Accounting Office report. "The

(Continued on page 67)

WHAT'S NEW IN MAJO

THE FIRST GENERATION of appliances that think for themselves has arrived. Spurred by a decade that combined energy shortages with abrupt technological leaps into the electronic future, today's appliance manufacturers have turned a corner in time. With yesterday's housewife out in the workplace, it might seem that nobody's minding the nest anymore. But soon the hum of the dishwasher that was instructed to turn itself on for nonpeak energy use will be kept company by the whirl of a convection oven starting dinner and the air conditioner cycling on just in time to cool the house before the boss gets back.

And every one of these smart little genies will be busily computing up the best ways to save energy as they go about their tasks. The credit for these new penny-pinching appliance personas can't be given to the appliance manufacturers alone. Actually they got a big boost down that road when the Department of Energy (DOE) began requiring them to tag all new appliances with energy-guide labels.

A careful reading of the DOE energy-guide label on that new refrigerator, range, freezer, clothes washer, dryer, dishwasher or room air conditioner, will give you information you need to figure its annual operating cost.

WHIRLPOOL'S ELECTRONIC DISHWASHER, MODEL SHU9900

TAPPAN'S SELF-VENTED INDOOR RANGE GRILL

You also need to know the cost per therm of various types of energy in your area. You will find the cost per therm on your utility bill. The energy label also shows comparison data which will allow you to tell

which model in any group the DOE has deemed most energy efficient.

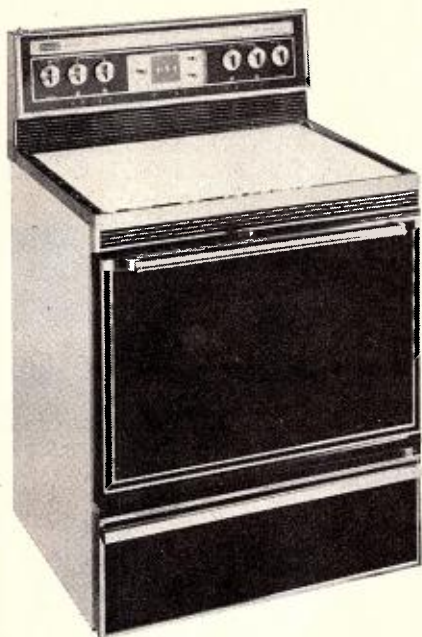
We all might love the idea of saving energy, but cost is still bound to prevent most of us from running right out to buy the totally electronic kitchens

shown by a Dutch manufacturer at a European appliance show last year. Yet it's certain that these smart machines will gradually work their way into our lives. They will save precious energy in the '80s and beyond because



R APPLIANCES FOR 1981

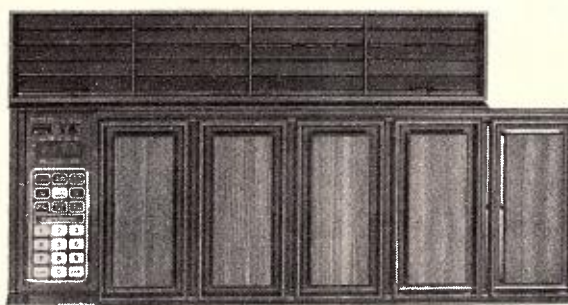
ROPER'S INDUCTION COOKING, SELF-CLEANING OVEN



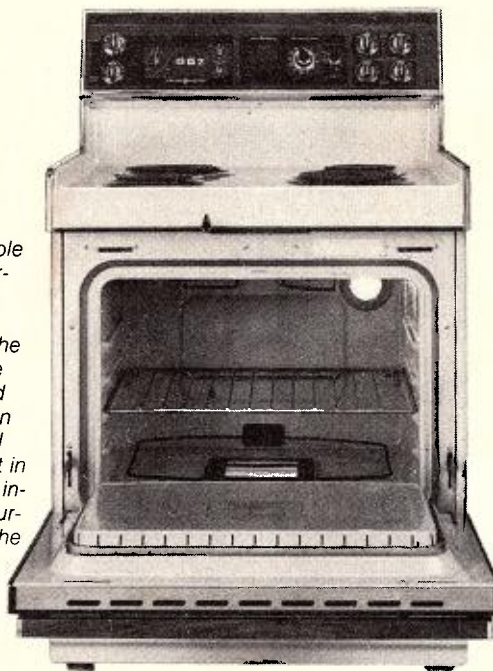
Using the principle of alternating currents, induction cook-tops cook without heating the surface. Only the pan and the food are warmed when the induction coil creates a current in on direction and induces counter current to occur in the steel or iron pan.

they are flexible. They are designed to remember individualized instructions, to analyze changing conditions and to figure out a sequence of functions in order to get their jobs done. Instead of appliances that generally

SEAR'S 9,000 BTU AIR CONDITIONER



GENERAL ELECTRIC'S TIMEMAKER RANGE, MODEL JBV42G



perform one simple range of tasks for everybody, the new generation will *customize* themselves to the owner and his needs. So, just because the Browns need to have their dishes fan dried by the dishwasher, don't

think for a minute that the Jones will be stuck with the same format. They'll tell their dishwasher that they want to save electricity by *air* or *natural* drying the dishes and at the same time they'll caution it to take special care with

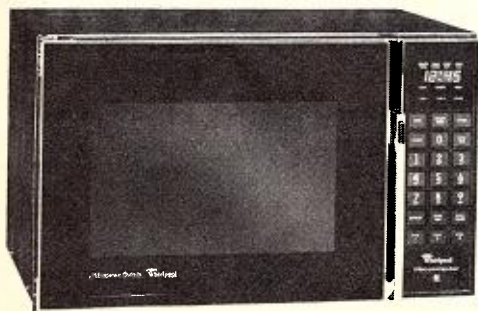
the china and crystal that's being washed after the dinner party tonight. As the cost of this technology goes down, more and more applications will come into play.

At present, some appliances are capable of notifying *the boss* that something is about to go wrong. The GE solid state dishwasher will go so far as to advise you whether or not to attempt the repair yourself. And, when the repairman shows up, Whirlpool's micro-computer controlled dishwasher will go through a self-diagnosis to help *him* figure out what's going on. Or, since one expert has estimated that the cost of the average repair will rise to around \$150 in the '80s, you might want to fix your Whirlpool appliance yourself. You can do this by calling the Whirlpool Cool-Line Service, a toll-free number with experts on the other end of the line who can *talk you through* a complex repair job.

Induction Cooking

One of the biggest kitchen energy savers ever to appear on the scene is induction cooking. It has been recently introduced and utilizes a long recognized principle of physics, the alternating current. Breakthroughs in semiconductor technology made it possible to use this principle for cooking. The induction cooktop, which is still rather high priced, (\$1100 for cooktop, \$1500 for range) is faster,

WHIRLPOOL'S MICROWAVE OVEN, MODEL RJM7800



AMANA'S ENERGY EFFICIENT 18 REFRIGERATOR/FREEZER



GENERAL ELECTRIC'S ELECTRONIC DISHWASHER, MODEL GSD2500



safer and more energy efficient than anything else on the market.

It uses 19 percent less energy than an electric coil top range, 40 percent less than a hot ceramic top, and an astounding 91 percent less than a gas stovetop. It is competitive with microwave in its heat-up time to boil water.

The induction cook-top looks the same as the familiar *hot* ceramic smooth top. The glass top is highly resistant so no current flows through it. One manufacturer, Roper Corp., claims that it is "essentially impossible to create a fire" on the cool top. Electronic sensors automatically shut down the current when the pan is removed from the stove. Cooking utensils that are attracted to magnets are required.

OVENS-RANGES

If you are looking for a range or an oven or cooktop that utilizes more familiar cooking methods, you may be stunned by the diversity that has crept into this sector of the home appliance field. Microwave and convection cooking as well as conventional principles have been applied in every combination possible so that now *combination* cooking enters the

field as a fourth option. And the energy-saving designs of today have changed even purely conventional models enough that buyers will have to slightly revise their cooking methods. Smaller oven cavities, more insulation and more efficient heating units have changed the way standard gas and electric ovens cook food.

Convection ovens break down the thermal barrier of food by using a fan to blow air around during cooking. It is still new enough that conflicting claims are being made for it. Billed as an energy saver, it does cut down cooking time, and costs, on foods that cook ½ hour or more. But its operating cost is higher than its conventional competition on short jobs like baking cakes.

The convection oven saves energy by generally requiring no preheating, and cooking foods like turkey in one-quarter the normal time at lower temperatures. It also produces great food results—beautiful browning, billowy souffles, excellent bread and juicy meats. And, you can use it as a small food dehydrator.

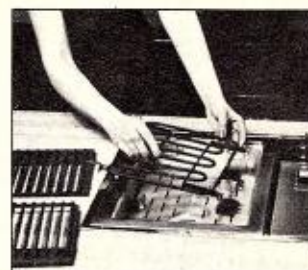
But try to steer clear of those countertop convection ovens that are uninsulated. They dissipate energy into the room, are hot enough on the exterior to produce a serious burn, and they require the heating element to run continuously, threatening early maintenance problems. In addition, because of the continuously running fan, some can be noisy enough to destroy the tranquility of your kitchen. So listen carefully to this oven before you buy.

Jenn-Air has a wall installed convection oven

(Continued on page 129)

STOVE-TOP MODULES

MORE AND MORE manufacturers are producing modular features to accessorize cook-tops. Below are some of Tappan's modules. From top to bottom: The cooking element plugs in to provide heat source for grill, griddle or rotisserie. A standard element plugs into the opposite side of the double unit. A cartridge pulls up to activate a powerful vent motor. When raised the vent draws in smoke and odors.



ROSE ANNE DE CRISTOFORO lives in Nevada with writer/furniture designer husband David De Cristoforo, a frequent contributor to MI. A practicing journalist, she has won several Nevada State Press Association Awards for work published in regional newspapers.

which uses an *automatic meat probe* feature to cook meats to a predetermined internal temperature. You'll also find convection ovens in ranges, sometimes with the addition of microwave and/or pyrolytic or self-cleaning capabilities. Amana's Radarange Plus offers microwave, convection or combination cooking. And you'll find countertop microwaves incorporating the convection feature to improve the appearance and quality of the food and to further speed the cooking process. The combination cooking feature is a very attractive one, because it allows for the shortcomings of one method (like microwave's poor browning and crusting ability for baked goods and meats) to be compensated for with the application of another method and vice versa.

Microwave ovens are still the cheapest to operate and they are gaining wider acceptance. Microwaves have more variable controls than they did in the early days, and this, combined with the addition of rotating turntables and top brown-

ing elements improves cooking results. There's still room for improvement according to testers. Most of these ovens are used primarily for defrosting, reheating and heating water for tea and coffee according to a 1980 study.

Microwave health hazard potential still worries some consumers. A Bureau of Radiological Health spokesman told us that he was confident the products put into the marketplace are safe for use. He did warn, however, that emission levels tend to rise over the life of the appliance. Standard safety precautions are: 1.) Never tamper with the door locks. 2.) Don't allow soil or cleaner residue to accumulate on sealing surfaces. 3.) Don't operate your microwave oven if it's damaged. Mechanical testers for radiation leakage have been discredited as inaccurate by the experts and the only way to have your oven tested according to up-to-date recommendations is to have your local health department check it.

The use of microprocessors in

GE's new microwave line allows the user to program the oven for automatic cooking. Humidity sensors determine cooking time and temperature. The oven will inform the user of mistakes in programming and keep her posted on the various stages of cooking.

Self-Cleaning Ovens. When you buy a new oven or range, don't be afraid of the pyrolytic self-cleaners. They've got an ill deserved reputation for being energy hogs because they use a special 850 degree cycle to clean the oven. Experts tell us that the added insulation in these ovens adds enough cooking efficiency to make up the difference.

AIR CONDITIONERS, REFRIGERATORS AND FREEZERS

Air conditioners, refrigerators and freezers all have the spectre of a Freon ban hanging over them. Freon contains fluorocarbons, which have been deemed a threat to the ozone layer of the earth's atmosphere. At present EPA is considering a plan to allow the use of Freon on a controlled basis, but the issue is by no means settled. Industry spokesmen say there is no substitute for Freon, but other analysts have forecast that a system of refrigeration developed by Rovac Corp. would come into use if Freon were outlawed. The Rovac system is based on the principle that when compressed air is allowed to expand, its temperature drops.

Energy efficiency pressures from DOE have led to design changes producing bigger and heavier room air conditioners. The first solid state air conditioner to be marketed was introduced by Sears in February of this year. The Sears air conditioner is a 9000 BTU window model that sells for about \$520. Sears spokesmen say it will save energy because of features such as automatic sensors which adjust to the changes in cooling requirements when a room fills up with people. An electronic timer and 4 different variable fan settings are other features of the Sears innovation.

Generally, room air conditioners with high DOE ratings also have higher price tags. But they also often have such highly desirable features as vent control, which allows the user to exhaust stale air. With the EPA's new finding that in-

(Continued on page 129)

MAJOR APPLIANCE MANUFACTURERS*

Key: 1-Air Conditioners 3-Dryers 5-Microwaves 7-Refrigerators
2-Dishwashers 4-Freezers 6-Ranges 8-Washers

- | | | | |
|---|---|---|---|
| ABSCOLD (7)
1751 Sheridan St
Richmond, Ind. 47374 | FRANKLIN MFG. CO. (4)
701 33 Ave. N.
St. Cloud, Minn. 56301 | KEEP-RIGHT INC. (1)
44 Elgin St
Brantford, Canada
N3T 5P4 | PHILCO INTERNATIONAL (1, 3, 4, 7, 8)
1720 Walton Rd
Bluebell, Pa. 19422 |
| ADDISON PRODUCTS CO. (7)
101 Railroad St.
Addison, Mich. 94220 | FRIEDRICH AIR CONDITIONING & REFRIGERATION CO. (1)
4200 N. Pan Am. (IH 35)
Expressway
Box 1540
San Antonio, Tex. 78295 | KELVINATOR APPLIANCE (1, 2, 3, 4, 5, 6, 7, 8)
4248 Kalamazoo Ave. S.E.
Grand Rapids, Mich. 49509 | QUASAR (5)
Div. of Matsushita
9401 W. Grand Ave.
Franklin Park, Ill. 60131 |
| ADMIRAL (2, 3, 4, 5, 6, 7, 8)
Magic Chef
1701 E. Woodfield Rd
Schamburg, Ill. 60196 | FRIGIDAIRE CO. (1, 2, 3, 4, 5, 6, 7, 8)
3555 S. Kettering Blvd
Box WC 4900
Dayton, Ohio 45401 | KITCHEN-AID (2)
Hobart Div.
World Headquarters Ave
Troy, Ohio 44720 | RICCAR AMERICA CO. (5)
3184 Pullman St
Costa Mesa, Calif. 92626 |
| AIR TEMP CORP. (1)
Feeders Corp.
Woodbridge Ave.
Edison, N.J. 08817 | GAFFERS AND SATTLER INC. (2, 5, 6)
Magic Chef
4851 S. Alameda St
Los Angeles, Calif. 90058 | LITTON (5)
1405 Xenium Lane
Minneapolis, Minn. 55441 | ROPER CORP. (3, 5, 6)
2207 W. Station St.
Kankakee, Ill. 60901 |
| AMANA REFRIGERATION INC. (1, 4, 5, 6, 7)
Amana, Iowa 52204 | GENERAL ELECTRIC CORP. (2, 4, 5, 6, 7, 8)
Major Appliance Business Group
Appliance Park
Louisville, Ky. 40225 | MAGIC CHEF (2, 4, 5, 6)
740 King Edward Ave
Cleveland, Tenn. 37311 | SANYO CORP. (3, 4, 5, 7, 8)
200 Riser Rd
Little Ferry, N.J. 07643 |
| ATHENS STOVE WORKS (6)
Box 10
Athens, Tenn. 37303 | GREENVILLE PRODUCT CO. (7)
635 W. Charles St
Greenville, Mich. 48838 | MANFIELD PRODUCT CO. (3, 8)
246 E. 4th St
Mansfield, Ohio 44902 | SEARS, ROEBUCK AND CO. (1, 2, 3, 4, 5, 6, 7, 8)
Sears Tower
Chicago, Ill. 60684 |
| BELDING PRODUCTS CO. (1)
115 E. Main
Belding, Mich. 48809 | GR MANUFACTURING CO. (4, 6)
1545 Clyde Park Rd
Grand Rapids, Mich. 49509 | MONTGOMERY WARD (1, 2, 3, 4, 5, 6, 7, 8)
or your local catalog office
Chicago, Ill. 60671 | TAPPAN CO. (2, 5, 6, 7)
Tappan Park
Mansfield, Ohio 44901 |
| CARRIER AIR CONDITIONING
Box 4808
Carrier Parkway
Syracuse, N.Y. 13221 | HARDWICK STOVE (5, 6)
240 Edwards St
Cleveland, Tenn. 37311 | NORGE (3, 8)
410 E. Lyster
Herrin, Ill. 62958 | THE MAYTAG CO. (2, 3, 8)
403 W. 4th St. N.
Newton, Iowa 50208 |
| CHAMBERS CORP. (5, 6)
Sub. of Rangaire Corp
Oxford, Miss. 38655 | HOOVER CO. (3, 8)
101 S. Maple
N. Canton, Ohio 44720 | NORTHLAND REFRIGERATION (4)
701 Ranney Dr
Box 114
Greenville, Mich. 48838 | TOSHIBA AMERICA INC. (5)
19515 S. Vermont Ave
Torrance, Calif. 90502 |
| COLUMBUS PRODUCT CO. (2)
300 Phillippi Rd
Box 28188
Columbus, Ohio 43228 | JENN-AIR CORP. (5, 6)
Carrier Corp
3035 Shadeland
Indianapolis, Ind. 46226 | O'KEEFE AND MERRITT (2, 5, 6, 7)
Tappan Park
Mansfield, Ohio 44901 | WEBSTER CITY PRODUCTS CO. (3, 8)
600 Stockdale St
Webster City, Iowa 50595 |
| DESIGN MFG. (2)
2000 Illinois Ave
Connersville, Ind. 47331 | | PANASONIC (5, 7)
Matsushita Electric Corp. of America
1 Panasonic Way
Secaucus, N.J. 07094 | WHIRLPOOL CORP. (1, 2, 3, 4, 5, 6, 7, 8)
200 U.S. 33 Hwy N
Benton Harbor, Mich. 49022 |
| EDISON PRODUCT CO. (1)
Rt. 27 & Vineyard Rd
Box 337
Edison, N.J. 08817 | | J.C. PENNEY (1, 3, 5, 6, 7, 8)
1301 Ave. of the Americas
New York, N.Y. 10019 | WHITE-WESTINGHOUSE APPLIANCE CO. (1, 2, 3, 4, 5, 6, 7, 8)
930 Ft. Duquesne Blvd
Pittsburg, Pa. 15221 |
| EMERSON QUIET KOOL (1)
400 Woodbine Ave
Woodbridge, N.J. 07095 | | | |
| FEDDERS CORP. (1)
Woodbridge Ave
Edison, N.J. 08817 | | | |

*This list of major appliance manufacturers in the United States and Canada is based on respondents to MI's survey and can be used for requesting additional information you may want. The report itself is based primarily on the trend to electronic models produced by many of these manufacturers.

A CLASSIC CORNER CUPBOARD

By Fred Neinast

THE corner cupboard for generations has been a symbol of home as well as a standard for storage and display. Solving the age-old problem of what to do with a room corner, it can be both a showpiece for you and a showcase for important china and glassware.

Constructing it generally involves more joinery technique than usual because of the triangular shape. Other than treading carefully at these points, you can build your cupboard with conventional shop tools in two or three weekends.

Our design is an example of the classic cupboard style, built somewhat larger than usual for the increased storage and display space. It is 7 ft. high and 3 ft. wide. Clear acrylic plastic shelves were used to promote a feeling of openness. The bottom was closed in and can be used for storage of bulky items.

Three separate units were made to fit each other—the first consisting of the bottom, center divider and the top pieces. Cut the boards to rough length and position them for penciling the pattern. You will be able to position the $\frac{1}{4}$ -in. dowels so that when you cut the boards, you don't cut them.

A dowel jig was used for all doweling. You can buy an inexpensive dowel set that includes drill, drill-stop and centering plugs. This set takes all the mystery out of hole

alignments, allowing perfect matching.

Oak was used throughout. I purchased $\frac{3}{4}$ ×8×8 boards and ripped all pieces to the widths needed. An accompanying list of materials tells you what to cut.



Corner cupboard is case construction of rails, styles, followed by paneling. Cupboard goes together in three stages.

Two special tools were used. One was a carbide-tip blade. The extra cost is well worth it in ease of cutting and saved time. Blades can be bought for either a table saw or a portable circular saw.

The other item was a chamfering bit used to joint the side panels for the triangular assembly.

To begin construction, the front-leg piece was cut out with a saber saw, following the pattern for shape and size. The front supports for this piece and the back supports were cut.

This is where the router's chamfer bit comes in use. Route the angles full length on each side. Assemble these pieces using dowels and glue and screws. Clamp all glued pieces until dry. The first unit now is complete.

Start the second unit—the bottom-front frame, doors and side corner-strip. Assemble all pieces of the door and frame with glue and dowels, making sure all corners are square. Rout the $\frac{1}{4}$ -in. rabbets.

Panels are cut to size and glued in place (small brads hold the panels in place). The 3-in. front corner-strips were made to accommodate the doors and are held together by framing strips, top and bottom. Side corner-strips were rabbeted and doweled to the front corner-strip. After the hinges are in place, this completes the second unit.

The top unit is a repeat of the bottom section except for door stops at the top. All pieces are the same width, although they are different lengths.

FRED NEINAST, usually behind the scenes at MI working on technical drawings for our how-to plans, takes a turn at designing and building his own furniture.



6 STEPS TO REJUVENATING YOUR LAWN



Prepare the seed bed by loosening the ground 1/4 in. with a rake so that the grass seed has good soil contact.



After selecting a weed-free grass seed, sow it at the most effective rate with a calibrated spreader for even distribution.



Fertilize at seeding time to feed the new grass and assure proper nutrients for a sturdy, fast-growing lawn.

SPRING always seems to arrive when we need it most, and along with that yearning for those first mild days comes the desire to get outdoors and get the lawn in shape for easy summer living.

During those warm, bright days of early spring, your lawn is emerging from winter dormancy with a hearty appetite. And it's those first feedings and attention that can make a big difference later on. The steps required to rejuvenate even a poor lawn are really very simple, according to experts at O.M. Scott & Sons, plus you're getting the added benefit of light outdoor exercise that is so enjoyable at this time of year.

Step 1: Always buy a top-quality seed. Remember that you are in effect buying a lawn, and a lawn can never be better than the seed it starts with. So select a seed that is as weed-free as possible (as close to 99.9 percent weed-free as you can find).

Check the contents label and stay

away from seed with any crop listed. Crop means that grass-type weeds are mixed in with the desirable grass seed. These are often uncontrollable.

Step 2: Prepare the seed bed well. In order to germinate and take hold, grass seed must make good contact with the soil. Never just toss seed on hard, bare ground. The tiny seedlings that moisture brings to life need protection from the drying effect of wind and sun in those first weeks before they establish a strong root system. So loosen the ground to a depth of one-quarter to a half-inch. Depending on the size of the area to be seeded, you may want to rent a power rake or simply use an iron hand rake or other tool to loosen or slice the soil.

Step 3: Sow grass seed at the most effective rate. When seed is spread too thin, too few plants germinate to establish a well-knit turf that helps to shut out weeds. Too heavy a

(Continued on page 130)

HOW NOT TO GET RID OF DANDELIONS

1. Cutaway shows the typical long root of the dandelion. **2.** Cutting a dandelion off, even below the soil line, does not remedy the problem; it just removes it temporarily. **3.** See what's happening? Less than a month later, the dandelion grows back from the portion of root left in the ground. **4.** Here it comes back up again. Not even dynamite will do the job. You need a combination fertilizer-weed control to get at the root of the matter.



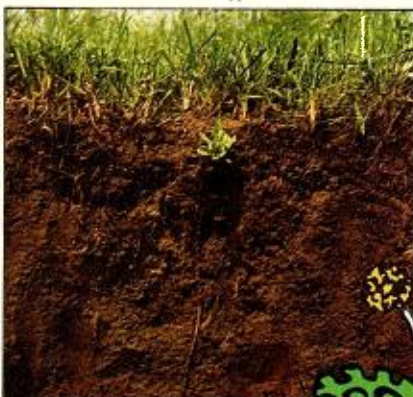
Moisture is very necessary for germinated grass seed, so water lightly and often to maintain the right moisture level.



1.



2.



3.



4.

BUILD A SUNSPACE ON A RAISED DECK

By Charles A. Miller



THERE are many houses in the country with limited opportunities for the addition of an attached greenhouse. Sometimes the house is oriented all wrong or the greenhouse just won't fit where it would be most effective.

We tackled just such a problem. Our house has an otherwise ideally-suited pair of glass doors onto a raised deck off the kitchen that faces south, but we didn't want to be encumbered by greenery at the doorway. The solution? We put the greenhouse over a window on the same side of the house.



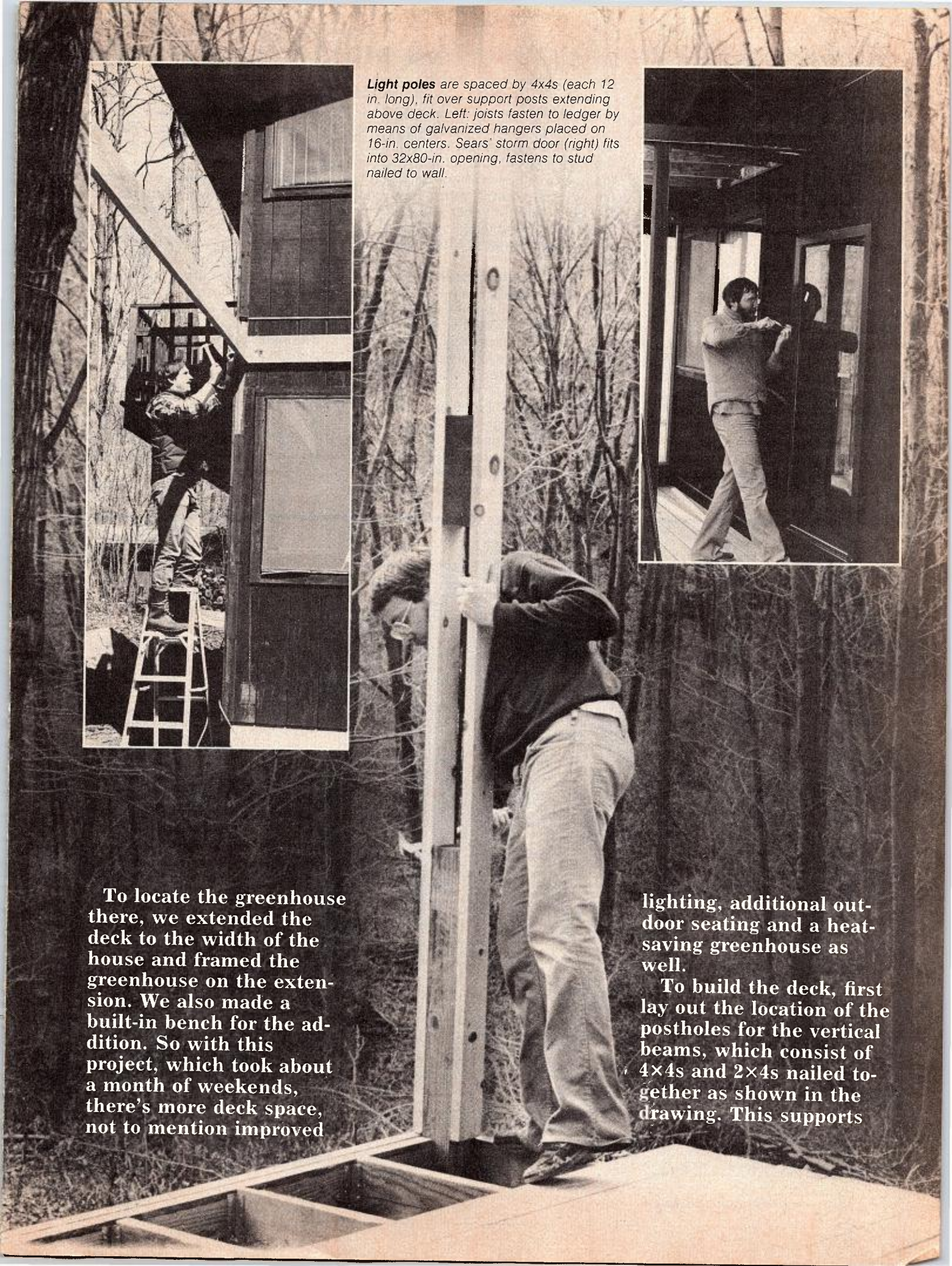
Light poles are spaced by 4x4s (each 12 in. long), fit over support posts extending above deck. *Left:* joists fasten to ledger by means of galvanized hangers placed on 16-in. centers. *Sears' storm door (right)* fits into 32x80-in. opening, fastens to stud nailed to wall.



To locate the greenhouse there, we extended the deck to the width of the house and framed the greenhouse on the extension. We also made a built-in bench for the addition. So with this project, which took about a month of weekends, there's more deck space, not to mention improved

lighting, additional outdoor seating and a heat-saving greenhouse as well.

To build the deck, first lay out the location of the postholes for the vertical beams, which consist of 4x4s and 2x4s nailed together as shown in the drawing. This supports



the decking. Measure 14 ft. out from the wall and dig the holes spaced 82-in. apart to a depth of 3 ft. (or deeper if your area has a lower frost line). Fill the footing holes with a 6-in. depth of gravel and place the posts on top of this, then backfill with gravel mix. With spirit level, make sure the posts are vertical in all axes, then brace until the concrete sets up. Since the wood is in contact with the ground or otherwise exposed to weather, we used Wolmanized lumber throughout the project to ensure long-lasting utility.

The next step is to fasten a ledger to the house at the level you want the deck to be. Ours was about 12 ft. above ground level, the same height as the ledger for the existing deck. This gives the level for the joists and beams. Be sure to account for the thickness of the deck planks.

To get the level all around, fasten the end joist to the house ledger with a joist hanger and run it out to the corner post. With a level, find the horizontal and fasten the joist to the post temporarily with a nail. Do the same with the other end joist. (With an existing deck, you could simply nail that joist to the existing joist.)

Making sure that the beams and joists are square, fasten the end beam onto the line of posts on their outside, then double the beam with the two 2×8s. Brace with 2×4s and fasten all around with galvanized lag bolts. Build the stairs and nail into place.

Next, measure off 16-in. centers for the joists on both the ledger attached to the house and the double beam on the outside. Nail on the hangers and place the joists.

Use 2×6s on the joists as decking,

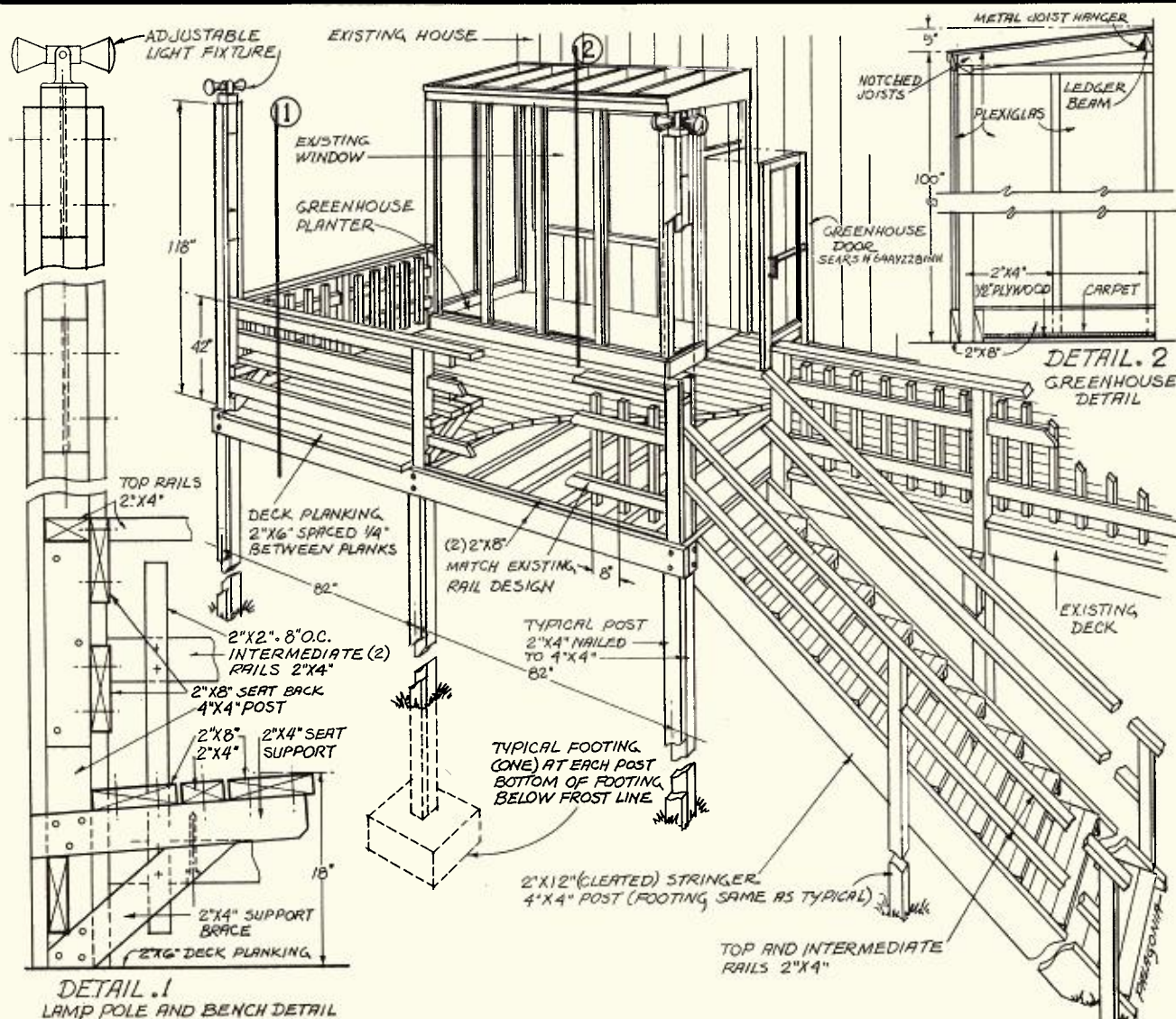
making sure there's a space of ¼ in. between each for drainage. Fasten the deck boards with 12d galvanized nails.

To fashion the railing, use 2×2s nailed to 2×4s on 8-in. centers.

The bench is made of two 2×8s on the vertical (the back rest) and a pair of 2×8s, with a 2×4 in the center on the horizontal (the seat). Again, make sure there is adequate spacing on the horizontal segment to allow for drainage. Brace with diagonal 2×4s.

The lamp poles are each two 5/4×4s spaced by 4×4s that are 12 in. long. The poles fasten on the outside of the 4×4 posts extending above the deck. Wire the fixtures before erecting the poles, running the cable through the center of the 4×4s to a junction box. Wire it to an indoor switch.

(Continued on page 134)



COAL FALLOUT

(Continued from page 55)

trade-off is made in each step of the coal fuel cycle—mining, transporting and using.”

And yet, as most experts agree, the country has no other choice. Coal is the only readily available replacement for oil while wind, solar and other renewable energy sources still are being developed. It's a less catastrophic threat than nuclear power, and it exists, which is more than can be said of synthetic fuels.

But most importantly, coal is economically appealing. According to John D. Rockefeller IV, governor of coal-rich West Virginia, “Coal is cheaper, it's here, it's American and there are plenty of people who need and want the work.”

To be sure, the United States has plenty of coal to burn—a staggering 438 billion tons of recoverable reserves, nearly one-third of the world's known supplies. At current consumption rates, that's enough buried sunshine to last the country some 320 years.

But converting the nation's power plants to coal from oil and natural gas will worsen the problem of air pollution. Each year, the U.S. pumps into the air some 30 million tons of sulfur dioxide, 25 million tons of nitrogen oxide and 3 million tons of sooty ash. A coal-based economy, even with the latest pollution controls, will increase smoke-stack emissions by 10 percent.

The health fallout from this black haze isn't mysterious. The National Institute of Environmental Health Science reports that coal pollutants can cause respiratory ailments ranging from asthma and heart disease to lung cancer. A decade-long study by Carnegie-Mellon University confirms those findings and notes that by reducing sulfate and particulate emissions 50 percent, the nation's mortality rate would drop by 4.7 percent—nearly 90,000 lives a year.

That likely won't happen. Since enactment of the 1970 Clean Air Act, an estimated \$100 billion has been spent on reducing airborne coal pollutants. Utilities now are required to equip their coal-fired boilers with costly electrostatic precipitators and fabric filters, called baghouses, to clean the soot and ash. To trap the sulfur oxides, special scrubbers use a limestone and water spray to turn the sulfur gas into a chemical sludge (and another hazardous waste).

Still, pollution controls may not be the final answer. “It's possible,” says independent energy consultant Laurence I. Moss, “for power plants to meet emission standards and still spew out enough fumes to obscure scenic vistas.” Moss explains that while baghouses and scrubbers are effective in removing 90 percent of the particulate tonnage, most of the smaller and more hazardous particulates still go up the stack. Moreover, no practical technology exists for cleaning up nitrogen oxides.

Gauging the effects of these offending chemicals on human health is difficult, though more is known about how coal emissions alter the ecosystem. In the early 70s, when coal producers first faced tough antipollution legislation, the trend was to build tall smokestacks to dilute the pollutants before reaching the ground—and the Environmental Protection Agency's monitors. That solved the local pollution problem, with the plumes drifting into the upper atmosphere rather than settling on surrounding communities.

But few scientists imagined that moist air would react with the pollutants to form airborne sulfuric and nitric acids. Prevailing winds could carry these deadly clouds thousands of miles—generally from west to east in the U.S.—before they dripped back to earth as acid rain. The result was a deadly precipitation.

Already, there's evidence that acid rain has damaged soil in New York, killed fish in Colorado and eroded buildings in Massachusetts. Chemical pollutants generated by industry in the Ohio Valley have blistered crops as far away as New England. A Library of Congress report indicates that acid rain has wiped out fish in 90 percent of the Alpine lakes in New York's Adirondack Mountains. Stretches of California and Rocky Mountain wilderness are tainted by pollutants reportedly from as far away as China and Japan.

Mountain lakes are particularly susceptible to the fallout because high-range soils lack the elements necessary to neutralize the chemicals. As the acid levels increase, salamanders and frogs die off and fish spawning ceases. Aquatic bacteria then disappear, allowing leaf litter to collect on lake bottoms. Eventually, all that's left are a few water bugs on a stagnant pool.

A similar but less caustic reaction occurs when acid rain falls on farm-

land. Some researchers have found that low levels of acidity actually benefit crops such as corn and tomatoes. In higher concentrations, however, the acids can disfigure and kill vegetation that ranges from alfalfa to pine trees. Forests stunted by acid rain, first identified outside industrial sectors of Scandinavia, are beginning to appear in New England.

Meanwhile, acid rain isn't the only climatic change feared in the switch to coal. Some environmentalists maintain that increased coal burning around the world will accelerate the buildup of carbon dioxide in the atmosphere, which could lead to catastrophic weather shifts.

One worrisome condition, known as the greenhouse effect, occurs when a thick layer of carbon dioxide admits sunlight but prevents heat from escaping the planet's surface. As temperature's rise—an average of 3° to 20° worldwide—a chain reaction is set off. Polar ice-caps melt, oceans expand. As a result, coastal regions are inundated.

This doomsday scenario isn't idle fiction. Burning the world's coal reserves could increase atmospheric carbon dioxide eightfold. Once in the atmosphere, the gas can linger there for hundreds of years.

The forecast isn't much brighter when you consider the environmental trade-offs from strip-mining some of the nation's most breathtaking landscape. Coal producers generally prefer strip to underground mining because stripping is three times as productive, especially out West where low-sulfur, low-pollution coal is found near the surface. But according to the Bureau of Mines, producing one billion tons of coal annually will devastate 150 square miles of land—an area twice the size of the District of Columbia.

In the West, the chief concern is reclaiming the land once the strip miners have shut down their shovels. Because many strippable coal beds lie near underground waterways or permeable rock called aquifer, surface mining could disrupt the West's fragile hydrologic system. During heavy rains, nearby waterways could become polluted by highly acidic mining runoff.

And in the high plain states, where 70 billion tons of prime coal reserves are found, the lack of water will make restoration difficult. Recently, a range war erupted between environmentalists and coal producers over the use of free-flow-

(Continued on page 133)

A comparison of projections from manufacturers' treadwear ratings under the new government Uniform Tire Quality Grading System indicates that on a government-specified course:

Uniroyal Steeler projected to last up to 24,000 miles longer than its major competition.

The U.S. Department of Transportation recently gave the public a standard yardstick to compare tires by.

Now, each tire company is required by law to grade its tires in three areas. Traction. Temperature resistance. And treadwear.

And then to emboss the resulting grades on the side of the tires.

When compared, most of the similarly priced steel-belted radials in the chart fared equally well in the traction test. Same for temperature resistance.

But one tire pulls ahead of the pack when it comes to the important grade that indicates the relative wear rate of your tire.

That tire: the Uniroyal Steeler.

In fact, when you translate its 220 rating into projected miles on the government-specified course, you see it was no photo finish.

On that course, the mileage projection for the Uniroyal Steeler is 66,000 miles.

That's 15,000 miles longer than the Goodyear, Goodrich, General and most Firestone ratings in the chart would project.

And 24,000 miles longer than Michelin's rating would project.

These mileage projections (including those in the chart) should be used for comparison only. You will probably not achieve these results. Actual treadlife will vary substantially due to your driving habits, condition of vehicle and, in many sections of the country, road conditions and climate.

Nevertheless, what do these ratings say about the Steeler?

They say when you compare the ratings, the Steeler should outlast its major competition under comparable conditions of consumer use.

UNIROYAL

Clip and take this to your Uniroyal dealer:

MANUFACTURERS' RATINGS FOR U.S. GOVERNMENT QUALITY GRADING SYSTEM			PROJECTION OF MILEAGE ON GOVERNMENT- SPECIFIED TEST COURSE
Manufacturer/Tire:	Traction and Temperature Resistance	Treadwear	
UNIROYAL Steeler	B/C	220	66,000
GOODYEAR Custom Polysteel	B/C	170	51,000
FIRESTONE 721 (13" & 14" sizes)	B/C	170*	51,000
GENERAL Dual Steel II	B/C	170	51,000
B.F. GOODRICH Life Saver XLM	B/C	170	51,000
MICHELIN XWW	A/B	140	42,000

* Most 15" Firestone 721 tires rated 200 which projects to 60,000 miles.

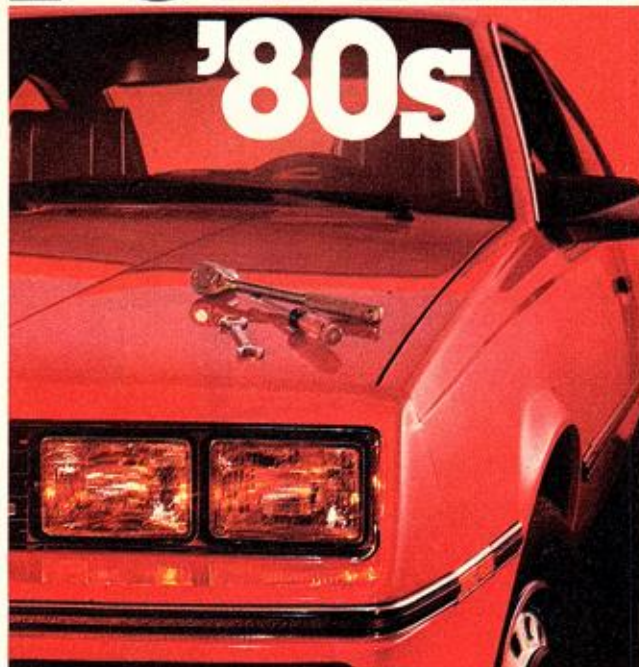
Source: U.S. D.O.T. 12/19/80.

For a free booklet on grade-labeling, please send your name and address to:
Uniroyal, Inc., Tire Advertising Department, Middlebury, Connecticut 06749.
©1981 Uniroyal, Inc.



SPECIAL SECTION

FRONT DRIVE FOR THE



IF YOU'VE been out shopping for a new car, you've probably discovered that most of the *really* new cars, the ones designed and built from the ground up for the 1980s, have their small, efficient engines mounted transversely, driving the front wheels.

That's because as car-makers struggle to make their cars smaller on the outside, they want them to stay as large as possible (or even grow larger) on the inside. And an easy way to make more room for people in a small car is to put all the driveline components—the transmission and drive axles, as well as the engine—up front under the hood. Then, if the driveline is mounted transversely that hood can be kept nice and short.

The transverse-engine, front-drive setup is great for interior roominess, but it can wreak havoc with some under-the-hood service routines.

But the carmakers, and the bulk of the new-car buyers, think the advantages of transverse-engine, front-drive still outweigh the disadvantages.

Because the carmakers keep designing and building them; and the public keeps buying them.

The latest of these space- and fuel-efficient cars, one that's at the leading edge of today's automotive technology, is from GM. It's this month's cover car: the J-Car.

Yes, the trend toward alphabetic names continues, right along with the trend toward transverse-

engine, front-drive. These names originated with the carmakers, where a single letter designates basically the same car that's going to be offered by different divisions of a car company. You see, while there's basically one J-Car as far as GM's engineers are concerned, there are three in the showrooms: Chevrolet's Cavalier, Pontiac's J2000 and Cadillac's luxury version, Cimarron.

To see exactly what kind of engineering and technology went into this latest of the latest, Paul Weissler went to Detroit to talk to the people who designed the car and its components. And I went to Detroit to drive a very-early production car. Our reports follow.

What also follows are car-by-car service comparisons of all the domestic-made transverse-engine, front-drives, as well as the major imported competition, starting with our cover car, the GM J-Car. These thorough, factual and useful reports were compiled by Paul Weissler, who is probably the most widely read automotive technical and service journalist in the world (even in Russia). He's written a number of car-service books and has been writing the Car Care column in MI for 15 years, formerly as Tom Tappett.

So if you now own, or intend to buy, or are just plain curious about the current main wave of automotive technology and want to know what service you can do yourself on the latest cars, read on.—Don Chaikin

**'80s DRIVING
REPORT:**

GM's J-CAR: FINALLY, A REAL IMPORT- BEATER

By Don Chaikin
AUTOMOTIVE EDITOR



A CARMAKER can spend the usual billions of dollars and invest years and years of development time to come up with some sophisticated engineering and still end up with an all-new car that's just plain uncomfortable, awkward looking and unpleasant to drive, despite its being super fuel- and space-efficient. And a car like that isn't going to sell. Certainly not in the numbers needed for the carmaker to recoup its investment.

Well, after having the opportunity to spend a day at General Motors'

proving grounds driving one of the new J-Cars, I'd have to say that GM should have nothing to fear.

The people at GM went to great pains to come up with a car that not only was as fuel-efficient as the car's intended major competition (that's spelled Japanese), they did their best also to match the competition on the competition's strongest points: quality of construction, careful attention to detail of fit and finish, interior comfort and general high level of amenities for driver and passengers. All this while hav-

ing a car that's more than a pleasure to drive.

And that's how I felt about the J-Car: fun to drive and comfortable. Time will tell if GM has matched the Japanese on quality of construction, though my early-built car (not hand-built prototype, but rather one of the first cars off the pilot assembly line) seemed to be well put together. And, yes, the seams all matched and there were no gaps, crooked panels or paint blotches.

The car I drove was the same red Pontiac J 2000 hatchback coupe



Pontiac J 2000



If driving pleasure and comfort count at all, the J-Car should do just fine.



that's on the cover. The Pontiac J-2000 and Chevrolet Cavalier both are available in a full range of bodies—everything from sporty coupes to four-door wagons, unlike the single-body cars they replace in their respective lines, the Pontiac Sunbird and Chevrolet Monza. The Cadillac version of the car, the Cimarron is available only as a four-door sedan.

My J2000 was equipped with the 1.8-liter (112-cubic-inch) Four and four-speed manual. That Chevy engine is all-new and for now the only one available in J-Cars (see the accompanying Technical Report for specifics). The four-speed, however, is basically the same one used in GM's X-Car line. (It has a smaller diameter clutch than the X-car.) My car also was equipped with power steering and the sports-handling suspension. All in all, I liked the way the whole thing worked. I liked driving it. I also liked looking at it.

Considering the competition for the J2000 hatchback coupe—Toyota Celica, Honda Accord, VW Scirocco—it's not very surprising that the car looks the way it does—much like the Celica. And why not? If GM's going to beat the imports at their own game, they may as well as start with appearance. The hood is low and the J2000 has the traditional Pontiac soft nose. The windshield is steeply raked and the

whole car has a sleek, low look. There's a wide black pillar before the rear side windows, which look much like those on the Chrysler TC3/024 hatchback. The hatch itself is a clean design of one large piece of glass.

The low roof takes its toll on rear-seat headroom, which is not ample for normal-size adults in this hatchback. But front passengers have ample headroom and overall I found the driving position quite comfortable. My car had bucket seats, which I found a cut better than the typical-for-Detroit variety. These have some side support and the backs are adjustable, just like the imports'. There's ample legroom as well as head- and shoulder room.

Despite the lack of headroom in the rear, the back seats themselves are comfortable. (I also was able to spend some time driving Chevrolet and Pontiac sedans and wagons. They offer a bit more rear headroom than the coupe, but are still lacking. They're also lacking more legroom back there. And with the front seats all the way back, there's not enough of it. Again, just like the competition.) The rear seatback in the hatchback and wagon, by the way, folds down to increase luggage space.

But GM's research, and that of other carmakers, too, shows the hatchback coupe buyer is not really

concerned (if at all) with rear seating accommodations. That buyer cares more about driving the car and having one other person up front. And the front of the J2000 has a nice, airy feeling to it. The dash is basically well laid out, and reminded me of something between a Chevette's and an X-Car's. Room here, I think, to learn from the Japanese. My J2000, though it had all the sports options, lacked a tachometer! Strange, the gauge package does not include a tach, which is an extra-cost option. The car does have a large glove compartment.

Even without the tachometer, the car was fun to drive. On straight acceleration runs, it tended to bog off the line. I don't know if that bog was peculiar to my early-built car or if it's a function of the fact that the J-Car is officially an '82 model and has to meet the stricter 1982 emissions requirements. The four-cylinder engine is equipped with GM's C-3 computer system to help.

In any case, I was able to get the car to 60 mph from a standstill in 14.2 seconds. I probably could've done better if my day with the J were not a snow-mixed-with-rain day, leaving the proving grounds wet at best, slick at worst. Those same wet surfaces also tempered my zeal on the skid pad and during handling maneuvers. But still, the car handled well. With the sports-

Carlton is lowest.



Box or Menthol:

10 packs of Carlton have less tar than 1 pack of...

	Tar mg./cig.	Nicotine mg./cig.
Kent	11	0.9
Kool	16	1.3
Marlboro Lights	12	0.8
Merit 100's	10	0.7
Virginia Slims	16	1.0

	Tar mg./cig.	Nicotine mg./cig.
Benson & Hedges Lights 100's	11	0.8
Pall Mall Light 100's	10	0.8
Salem Lights	11	0.8
Vantage 100's	12	0.9
Winston Lights	14	1.1

Carlton Box—lowest of all brands.

Less than 0.01 mg. tar, 0.002 mg. nic. Carlton Menthol—Less than 1 mg. tar, 0.1 mg. nic.

Box: Less than 0.01 mg. "tar", 0.002 mg. nicotine av. per cigarette
by FTC method. Soft Pack: 1 mg. "tar", 0.1 mg. nicotine;
Menthol: Less than 1 mg. "tar", 0.1 mg. nicotine
av. per cigarette, FTC Report Dec. '79.

Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

Chrysler's 250. More thrust than some motors twice its size!

Your Chrysler Marine dealer knows that to move a displacement hull like a pontoon boat, you need high thrust, not high HP. His Chrysler 250 (9.9 HP) and 180 (7.5 HP) outboards are expressly designed for displacement hulls. Both feature high-torque powerheads, ultra-low gearing, oversize props and extra-long shafts.

Features that give Chrysler's 250 and 180 the *highest forward and reverse thrust of any BIA-rated engines of comparable horsepower.* No wonder the 250 can outperform a conventional 20 HP motor on a 24' pontoon boat!

Why buy extra gas for horsepower you don't need? See the outboard expert, your Chrysler Marine dealer, for his high-thrust 250 and 180 engines.

We don't want to sell you any more outboard than you need.



handling suspension, it kept a nice, even keel during most maneuvers and exhibited the by-now typical mild understeer that, especially in the wet, can be changed to oversteer in fast tight turns on command by suddenly decelerating in mid-turn. The tires were the limiting factor in the car's wet handling, as well as its wet stopping.

The brakes are disc/front and drums/rear and did an admirable job in the wet-surface panic stops.

The front suspension is the usual MacPherson strut and the steering is fairly quick rack-and-pinion. The power and manual steering gears have different ratios. The rear suspension is what's new under the car. It's designed by Pontiac and has a torsion-beam axle with coil springs and semi-trailing arms.

The old front and new rear give the J-Car a ride that's about average for the class. My coupe had a taut but not overly harsh ride. The

rear tires thumped along over bumps and joints, but they stayed planted on the road.

The car isn't at all tiring to drive and it's not at all a chore, like some other small cars. Part of the credit has to go to the four-speed which has ratios that are nicely mated to the new engine. All of the shift points are right about where you'd expect them. And the transaxle's final drive of 3.65:1 is nicely offset by fourth gear's .81:1 overdrive.

The shift pattern, by the way, has Reverse to the left and forward, next to First. But there's an effective shift-lever, plunger-type lockout to keep you from accidentally going into Reverse and backing into the car behind you at stoplights. The shift linkage on my car was quite stiff, which I guess was to be expected, since the car had all of 35 miles on it when I drove it. Though the linkage has been improved over the X-Car's, and has less of the vague rubbery feeling than the X-Cars, the individual gates are rather far apart and making the shift from Second all the way over to Third takes some getting used to.

The car is also available with a three-speed automatic, which is borrowed from the X-Car line. The J-Car's automatic, though, has a lockup clutch on the torque converter for improved fuel economy. The X-Car doesn't, yet.

In size and weight, and in price, the J-Cars are aimed right at the import and between the key domestic competition. My J-Car coupe has a wheelbase of 101 inches and an overall length of 173 inches. That makes it a tad smaller than Chrysler's K-Car and bit larger than Ford's Escort/Lynx. The J2000 weighs in at about 2,350 pounds, about the same as the K-Car but about 500 pounds more than the Escort. It's nearly identical to the Japanese competition.

The EPA classifies the J-Car as a four-passenger compact—same as the Escort—and though the EPA hasn't given the J-Car a fuel economy rating as of this writing, GM is projecting (realistically, too) city economy in the high-20 mpg range and highway economy of better than 40 mpg. That's better than the import competition.

What had better be *less* than the import competition is the car's price: Chevrolet and Pontiac J-Cars will be available from *about* \$6,000 up to *about* \$10,000. It's exactly how *about* they'll be that counts. **MI**

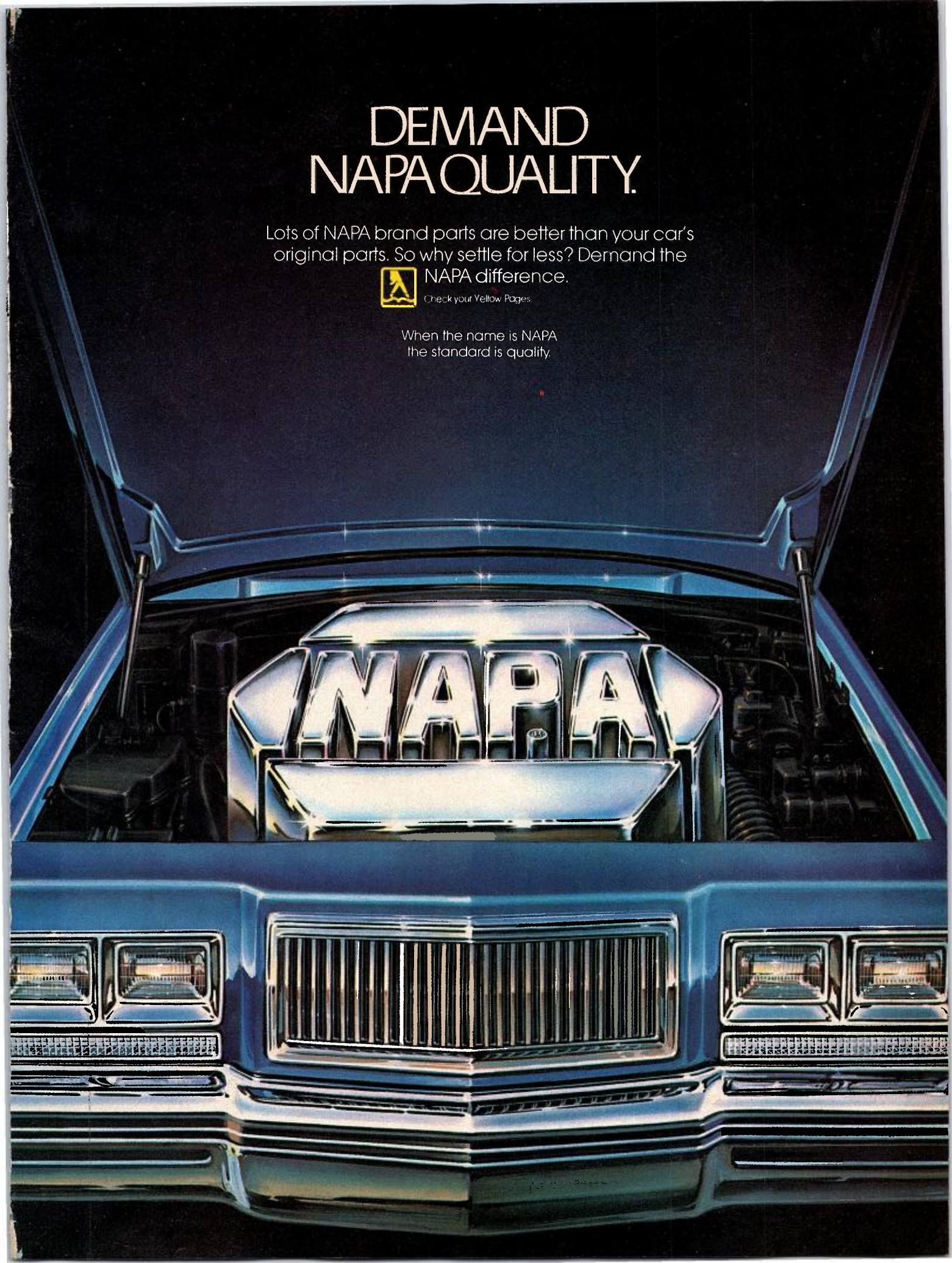
DEMAND NAPA QUALITY.

Lots of NAPA brand parts are better than your car's original parts. So why settle for less? Demand the NAPA difference.



Check your Yellow Pages.

When the name is NAPA
the standard is quality.



'80s TECHNICAL REPORT

NEW ENGINEERING FOR THE J-CAR

Car is a four-passenger and has enough interior volume to be rated a compact by the EPA. Front seating room is quite ample; rear is no worse than most imports—and better than some.

Attention to the details of the car's finish shows in places like trim moldings, which have plastic end caps, and the paint job. The car is wet-sanded prior to painting.

Doors' outer shells are one-piece stampings and doors are mounted on welded hinges. This is to insure that they're hung evenly on assembly. There's only minor provision for adjustment of the striker plate.

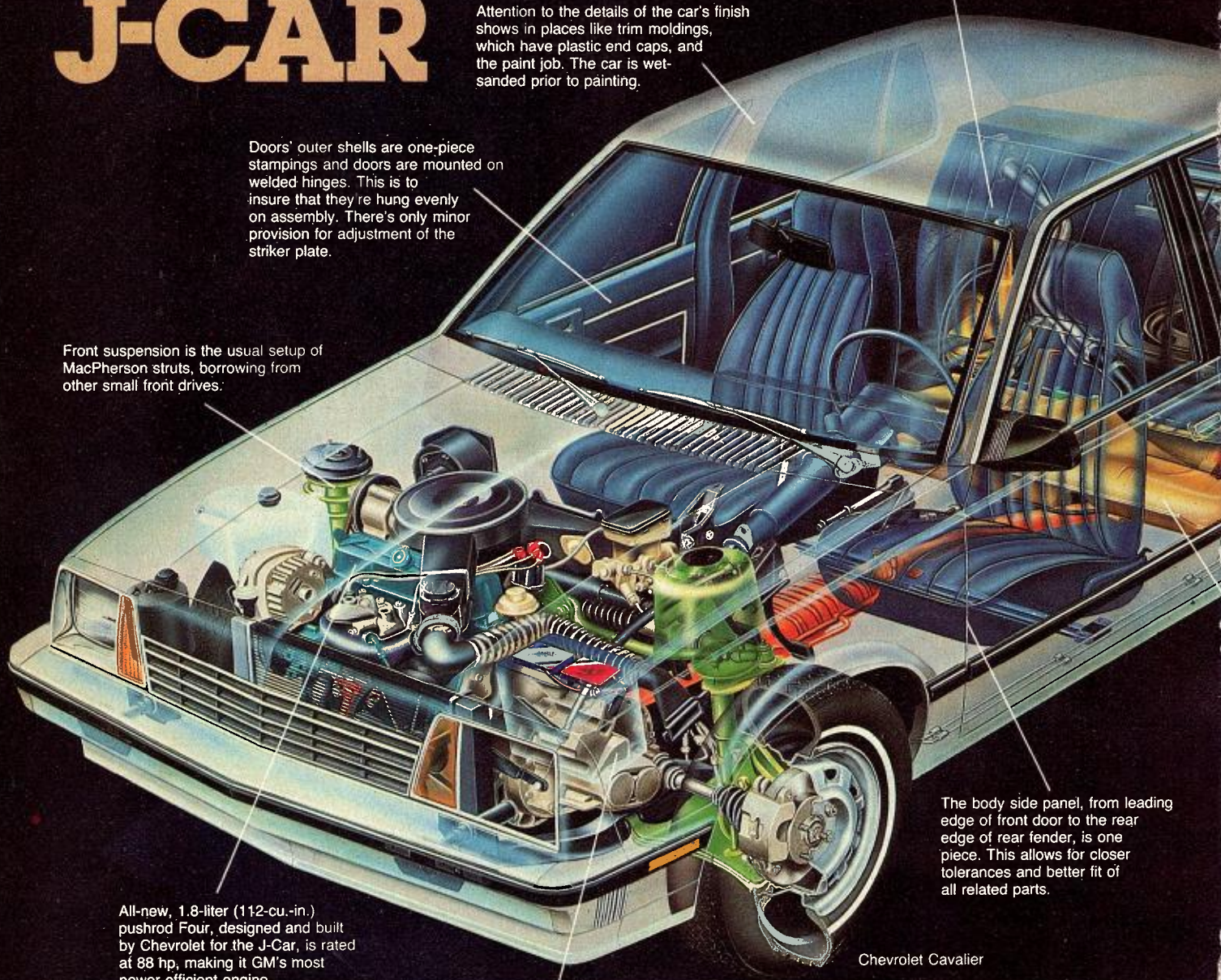
Front suspension is the usual setup of MacPherson struts, borrowing from other small front drives.

All-new, 1.8-liter (112-cu.-in.) pushrod Four, designed and built by Chevrolet for the J-Car, is rated at 88 hp, making it GM's most power-efficient engine.

Transaxle is borrowed from the larger X-Cars. Both automatic and manual four-speed overdrive are available.

The body side panel, from leading edge of front door to the rear edge of rear fender, is one piece. This allows for closer tolerances and better fit of all related parts.

Chevrolet Cavalier



SOMETHING OLD, something new, something borrowed and something blue are themes that may be loosely applied to the new General Motors transverse-engine, front-drive J-Car.

The three areas where the saying is most applicable are the engine, the suspension and the body.

ENGINE

The mixed-bag look is particularly noticeable on the engine. In an era when aluminum-head overhead cams represent state-of-the-art, GM has designed a 1.8-liter (112-cubic-

inch) pushrod Four, that's all cast iron and which seems like its engineering is out of the 1950s.

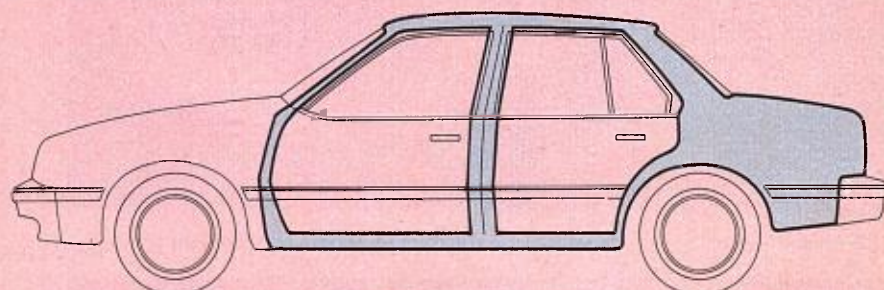
But this pushrod engine is state-of-the-art. It's a high-revving power plant (6,000 rpm redline) with performance that beats competitive overhead cammers. In fact, at 88 hp it produces more power per liter than any other GM engine in stock trim.

The reason for the pushrod design was simple enough: For the transverse-engine installation, it meant that an external belt drive needed to drive an overhead cam-

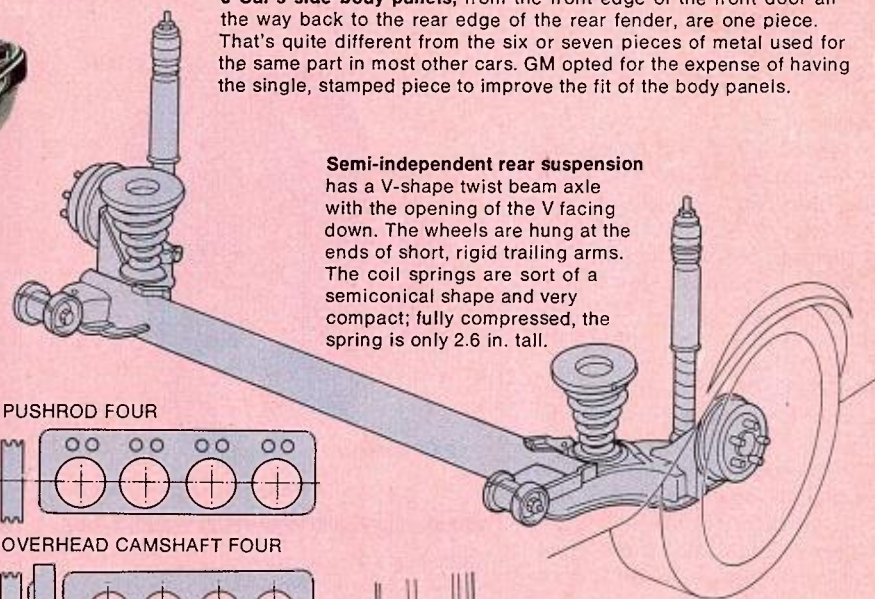
shaft could be eliminated, saving more than an inch in engine length. So the engine can have larger bores, which not only helps low-end breathing, but permits an eventual, theoretical displacement of as high as 2.2 liters. This is handy if you want it to be your Four of the future and cover all corporate applications. GM isn't totally giving up on overhead cams. In fact it will install a Brazilian-made OHC in the Pontiac J-Car next year to cover a capacity shortage on the pushrod mill.

To help the pushrod engine rev

J-Car's trunk volume is among the best in class. At 13.2 cubic feet, with rear seat up, it's almost as large as a Rabbit's—with the rear seat folded down.



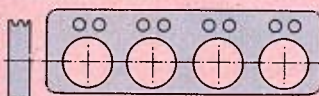
J-Car's side body panels, from the front edge of the front door all the way back to the rear edge of the rear fender, are one piece. That's quite different from the six or seven pieces of metal used for the same part in most other cars. GM opted for the expense of having the single, stamped piece to improve the fit of the body panels.



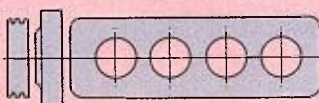
Semi-independent rear suspension

has a V-shape twist beam axle with the opening of the V facing down. The wheels are hung at the ends of short, rigid trailing arms. The coil springs are sort of a semiconical shape and very compact; fully compressed, the spring is only 2.6 in. tall.

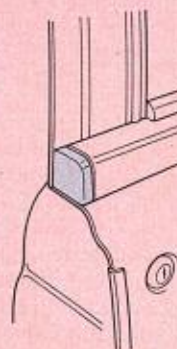
PUSHROD FOUR



OVERHEAD CAMSHAFT FOUR



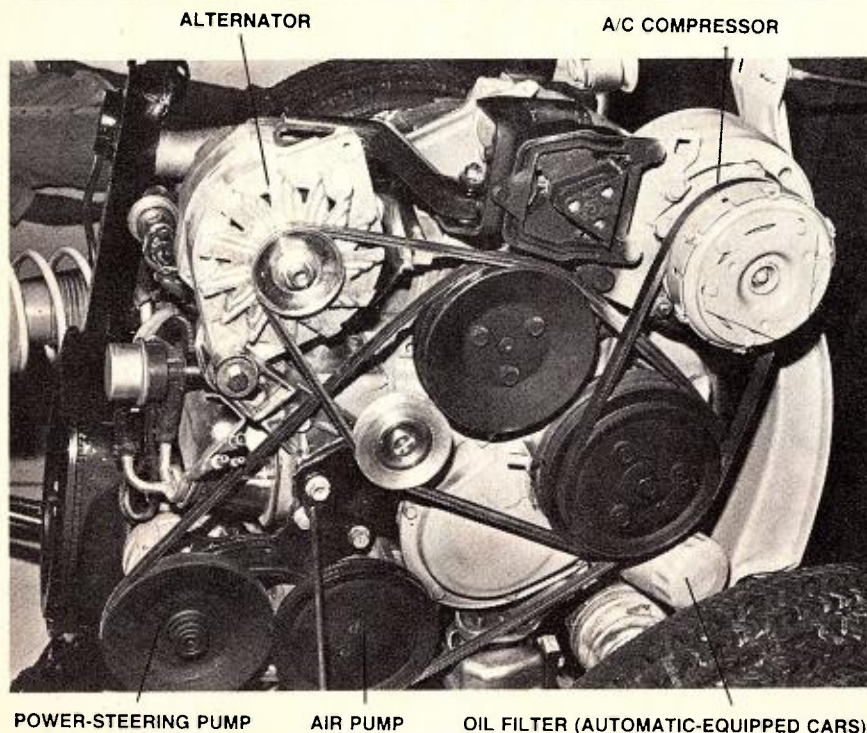
With simple schematic above, you can see that by opting for a pushrod engine design, without the chain or belt drive needed for an overhead camshaft design, GM was able to develop a pushrod engine of the same overall size as an overhead cam, but with larger cylinder bores for more displacement.



Plastic caps on the ends of body molding strips instead of crimped closures are one GM attempt to improve the small-but-noticed details in a finished car's appearance.

The rear suspension is all-new and designed by Pontiac. Compact design has a V-beam rear axle, short, rigid trailing arms and compact, conelike coil springs.

The fuel tank is located ahead of the rear axle. This allows for a larger trunk as well as better rear-end impact protection than if the tank were behind the axle.



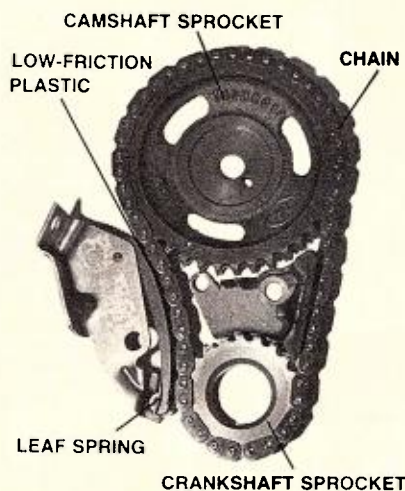
View of the pulley end of the J-Car's engine shows positions of the various accessories. Oil filter is on that end, too.

higher, the camshaft is mounted relatively high in the block. The pushrods are only 7 inches long, appreciably shorter than what they'd be with a typical camshaft location. These shorter pushrods flex less as engine rpm increases, which keeps the valve train running properly at high rpm.

The camshaft itself is designed for a relatively flat torque curve. There's a difference of only 1 foot-pound of torque (97 vs. 98) between 2,000 and 4,000 rpm, so acceleration is consistent throughout the range. You've really got to rev the typical overhead cam engine to get it to move.

The better low-end breathing from the larger bores occurs because larger valves can be used. The pushrod design, as a result, also has a potentially smoother idle with less fuel used than an overhead cam. Chevy's Jim Walker, who headed the engine design team, says that although direct measurements of idle fuel savings weren't made, they were in excess of 5 percent over a comparable OHC.

Although the use of the hemispherical combustion chamber is widely recognized as the best way



Camshaft's timing chain has a tensioner with a special spring-loaded, rubbing block made of low-friction plastic.

to promote fast combustion (which results in more power), it was not an option available to the GM engineers. GM is planning to convert this engine to a diesel in a few years, and to be able to use as much of the cylinder head machinery as possible, the valves must be vertical, not canted as in a hemi. With vertical valves, it is not difficult to change the compression ratio with combustion-chamber volume reduction.

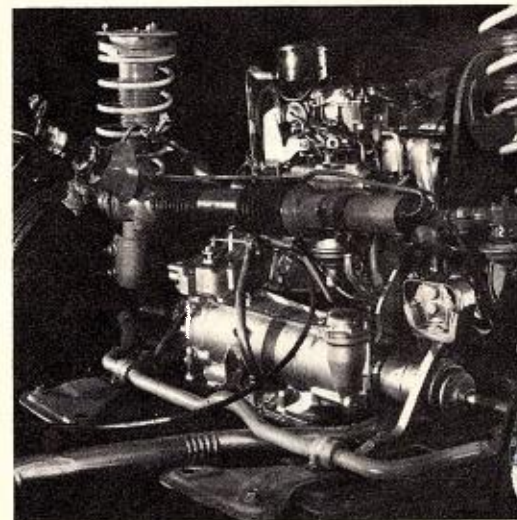
So the GM team went to a refine-

ment of what is used in the Chevette. It appears to be a hemi with an arc sliced out. Although the J-engine combustion chamber looks similar, Walker says, the fuel mixture burns a lot faster.

How do you get a fuel mixture to burn fast? GM did it by getting the incoming mixture to swirl about a centrally located spark plug; by creating mixture turbulence in that same area; and finally, by getting the burned exhaust gases out fast, so a fresh charge can come rushing in.

The 1.8-Four's cylinder head is a crossflow (intake mixture comes in one side, exhaust flows out the other), which helps scavenge exhaust gases. The intake and exhaust ports are carefully shaped, so the incoming mixture swirls and the exhaust speeds out. There's a lot of cut-and-try engineering in this work, and what appears to be a restriction to flow may actually turn out to be an aid.

Compared with the Chevette's combustion chamber, the J-Car chamber has a section that is filled



Rear, or firewall, view of 1.8-liter engine shows transaxle and high positioning of the steering rack.

in, so the intake mixture is squished as the piston rises, causing it to become turbulent.

Without the use of aluminum, hemi-shape combustion chambers or an overhead cam, the J-Car engine has so little sex appeal to the lay public that Walker is trying to promote the name *Fast Burn*.

However, if the engine isn't novel, it certainly doesn't seem to lack attention to detail:

- The hydraulic lifters are a pre-

PENNZOIL. FOR CARS LIKE JOHNNY'S. AND BETTY'S. AND YOURS.



Johnny Rutherford and his wife Betty.

Pennzoil users.

The three-time Indy 500 winner runs with Pennzoil for top engine protection at blazing speeds. (After all, that's a \$40,000 Cosworth engine powering Jim Hall's Pennzoil Chaparral.)

Betty uses Pennzoil too. But she gets her engine protection with Pennzoil's regular-priced gas-saving multi-weight oil.

Pennzoil. For cars like Johnny's. And Betty's. And yours.

Ask for it. Gas-saving Pennzoil. Quality in every extra mile.





THE LESS YOU USE YOUR CAR THE MORE YOUR ENGINE NEEDS RISLONE!

Engines used for stop and go trips, or run for less than half an hour at a time, form crankcase sludge! Sludge plugs oil filters and oil passages. It can block the oil pump screen so that working parts may starve for oil!

RISLONE cleans up on sludge. Dissolves it. Keeps it from fouling up your engine's lubrication system. And that's good. A clean engine starts easier, runs better, lasts longer and gives you more gasoline mileage.

So, if you run your car less today, take better care of it with RISLONE. RISLONE has been used for over 50 years by millions of motorists in big cars, small cars, foreign cars, trucks, boats and diesels too. Use it with every oil change.

Get RISLONE at your local auto merchandise store. It comes in a big quart yellow, red and black can . . . enough product to keep your engine clean and efficient.



FREE: 32 page LUBE TIPS Booklet. Information, ideas and discussion about lubrication, problems and performance. Send self-addressed stamped envelope 4½ x 6½ or larger.

THE SHALER CO.

Waupun, Wisconsin 53963

In Canada: Warren Packaging Co. Ltd.
Scarborough, Ontario

mium design. Instead of a simple antiwear coating on the base, they have a welded-on base of a special cast-iron alloy that is more resistant to pits and cracks. It's one of the things GM borrowed—from diesel engine practice.

- The pushrods are ball-end, not just rounded, for better load distribution. This is borrowed from some premium GM engines which have had the ball-ends.

- The valve stem oil seals are a high-temperature rubber, with a grooved or spiral design (depending on supplier) on the surface the stem slides against. The groove or spiral holds a small amount of oil, so the stem is lubed but a lot of oil doesn't get sucked into the combustion chamber. GM borrowed this one from the old Vega aluminum four-cylinder, an engine that was notorious for eating conventional valve stem seals and burning a lot of oil as a result.

- The engine's cam drive chain is extra wide, and to handle oscillations normally encountered with Fours there's a stationary chain guide with a low-friction-plastic tensioner loaded by a leaf spring. The tension automatically compensates for chain stretch, and GM expects the chain to be quiet for the life of the engine.

- The 1.8-Four's pistons are designs from the Citation V6, but the piston ring has been narrowed slightly so it won't flutter at high engine speed.

Chevy had design responsibility for the new engine, will build it in cast iron (weighing less than 320 pounds, it meets GM's weight goals) and, of course, will paint it the traditional Chevy-engine blue.

Chevy has taken some unusual steps to make sure this engine gets built right. First, the assembly line is designed to run backward as well as forward. If a defect is discovered at the end of the line, the line can be reversed and the engines disassembled until they come back to the trouble spot. Here the defective parts are replaced or the assembly procedure corrected.

All engines will be run on a stand by an electric motor to measure friction, oil pressure, manifold vacuum and valve action. Also, each engine will be started and run before it leaves the engine plant. (This means the ignition coil must be bolted to the engine. The location chosen—the underside of the intake manifold—creates serviceability problems. Unfortunately, you can't win 'em all.)

SUSPENSION

The front suspension is similar to that of the X-Car but it's being assembled in a way you'll be hearing a lot about—net build. This means the parts are made to tight tolerances; they just have to be bolted together. There's no provision for adjustment of camber (the vertical in/out tilt of the wheels) on assembly.

The Japanese have been doing it this way and GM is determined to equal or exceed their procedure, even if (as in this case) they're picking up one of the Japanese's less successful ideas.

Once the car suffers normal wear and tear (including spring sag), camber changes. It usually doesn't happen in the warranty period, but we do tend to keep our cars longer than 12,000 miles. To get camber as close as possible to specs on Japanese cars, American alignment shops have developed a variety of procedures, including the use of special equipment to move the MacPherson strut towers.

The J-Car strut is held by a two-bolt arrangement to the steering knuckle, just as on the X-Car. One bolt on the X, however, goes through a slot rather than a round hole, and the bolt has an eccentric surface so it can be turned to provide camber adjustment.

That slot has been eliminated on the J-Car. Engineers say no camber adjustment ever will be needed. (Nothing like optimism.)

As of this writing, though, GM service specialists have convinced the engineers to make a provision for precision enlargement of the hole, just in case.

The semi-independent rear suspension, a Pontiac design, is a twist-beam design with trailing arms welded to it. Although that may sound familiar, it's one of the really new items on the J-Car.

The twist beam is a V-shape, compared with the T-shape on the Rabbit and the U-shape on Audi/Dasher and X-Car. The open end of the V faces downward, which gives different handling characteristics than if it faced sideways or up.

The V-shaped beam is located somewhat forward, compared with the U-beam of X-Car, which permits GM to go with short, rigid trailing arms rather than long, flexible ones, as on the X. The flexible arms can't carry lateral loads, so the X-Car has a track bar for that purpose. Rigid arms eliminate the need for a track bar on the J.

The rear coil springs also are a

New Winston Ultra

Only
5 mg

**The first
ultra low tar
built on taste.**

Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.



GOODYEAR'S ALL-SEASON, ALL-TERRAIN,

**It's as quick in
the rough as it is
on the smooth.**



Your off-road vehicle is used on rough terrain, as well as on smooth roads.

It needs a tire that works well at both: Goodyear's Wrangler All-Season Radial.

Wrangler Radials have proved their quickness in the rough. Over the past few years, they've built an impressive

string of victories in off-road racing.

The fact is, Wrangler Radials were developed and proved in off-road racing. At races like the Baja 1000, the Mint 400, the Parker 400. To name just a few.

And for on-road driving, Wrangler Radial has steel-belted construction. With

LOW-COST LIFE INSURANCE FOR YOUR CAR.



Not so long ago, it was easy to buy an economy car for two or three thousand dollars.

Today, you're lucky to find one for *five* thousand. And replacement engines haven't gotten any cheaper, either.

So it makes sense to change your oil and put in a new Fram oil filter *at least* as often as your owner's manual tells you to.

After all, a new Fram oil filter doesn't cost much. A new engine does.

But, the choice is yours.

You can pay a little now.

Or a lot later.



Fram and Autolite are Bendix Companies
Fram Corporation, Providence, Rhode Island 02916

HOW TO SERVICE:

HONDA



ONE OF THE oldest transverse-engine, front-drive cars around is the Honda Civic, which grew from a minicar to a subcompact this year. These cars still are small by American standards and contain no provision for such a U.S. amenity as power steering. And air conditioning is a rara avis. In addition, the Japanese have not yet made a swing to computer control of engines. And, as a result, their powertrain compartments are somewhat more open. But though the Honda advertisements proclaim simplicity, not everything is obvious.

The ignition system holds one example. In general, you'll find everything accessible. Spark plugs are on the front side, the distributor is right there, horizontally mounted on the flywheel end of the engine, and the ignition coil is on the firewall at the passenger's side. The coil's top is covered by a big waterproof boot integral with the coil secondary wire. The location seems to call for the water protection, but the boot does require a bit of care in handling to be sure the coil wire goes into its terminal and the boot fits properly.

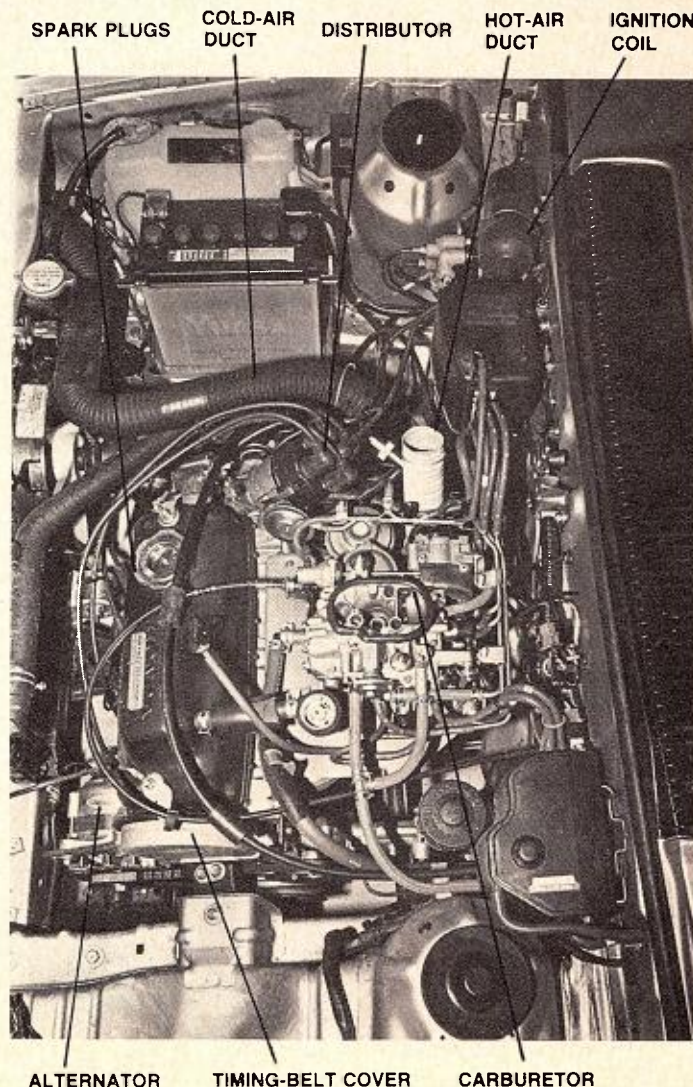
So much for the obvious. Now let's talk about the timing marks. Everyone knows they're either on the front cover and pulley or on the flywheel and visible through an opening in the transmission half of the flywheel housing. If you're an old British sports car buff, you may even look underneath, at the bottom of the front cover. All these locations turn up nothing. Instead, look on the front side of the engine,

at the joint with the transmission, behind a sealing rubber plug.

The fuel system also has some out-of-the-ordinary items, beginning with the air-cleaner housing. It's held by five nuts and one Phillips-head screw, all accessible with the cover off, plus an external screw in addition to the usual center wing-nut. It's not that Honda is afraid the

housing is going to fall off; rather it uses the air-cleaner housing to support some tubing underneath.

Once you think you have everything disconnected and free, lift up the air-cleaner housing and you'll find a sensor held by a grommet. Don't struggle to get it out. Instead, trace its wire to a nearby connector and unplug it.



SPARK PLUGS

COLD-AIR DUCT

DISTRIBUTOR

HOT-AIR DUCT

IGNITION COIL

ALTERNATOR

TIMING-BELT COVER

CARBURETOR

For every ten gallons of fuel oil you burn, you may waste four

At more than a buck a gallon, who can afford that?

Your old, inefficient oil burner may turn as little as 60% of your expensive fuel oil into useful heat.

But a new INTERburner™ replacement oil burner is *highly* efficient, because its exclusive, patented Turbo-Reversed Air System burns hotter, cleaner. And puts nearly every drop of oil to work where it can do the most good—heating your home.

Some INTERburner owners report cuts of up to 40% in oil consumption (without “dialing down”). That means, if you used 1000 gallons of fuel oil *this* heating season, INTERburner could save you up to 400 gallons *next* season.

An INTERburner runs whisper quiet. It even saves on electrical bills, because its Interrupted Ignition uses only a fraction of the power other burners need.

Since it's an energy-saving product, an INTERburner qualifies for Federal Energy

Tax Credits on your income tax. And every INTERburner is UL-listed and factory-fired for your peace of mind. It's made in U.S.A. and parts are readily available.

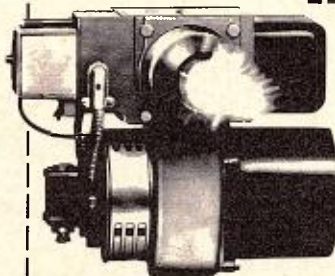
You've wasted enough expensive fuel oil. It's time to talk to your local Qualified

INTERburner Installer. He's a pro. A graduate of the intensive INTERburner training program.

He'll give you a *free* energy audit of your present oil heating system. And tell you how much *you* can save with INTERburner.

Act now! Send the coupon or call our toll-free number.

Call Toll-Free 1-800-“I AM COLD” (In Washington state)
call 206-746-5701)



INTERBURNER IS MANUFACTURED FOR THE U.S. AND CANADA BY SLOAN VALVE CO. OF ILLINOIS UNDER EXCLUSIVE LICENSE FROM ELECTRO-OIL CO. AB OF NORRKOEPING SWEDEN.

MI 581

INTERburner™ BY SLOAN

SLOAN VALVE COMPANY
10500 Seymour Ave. Franklin Park, IL 60131

Send me full details on INTERburner.

NAME _____

ADDRESS _____

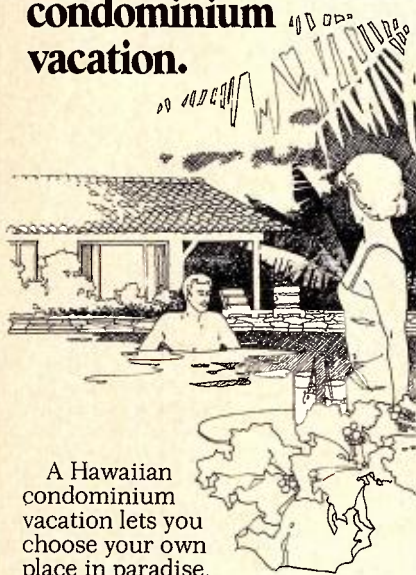
CITY _____ STATE _____ ZIP _____

PHONE: area code _____ - _____

United Airlines and
Creative Leisure
present:

Privacy in Paradise.

Choose your own
Hawaii with a
condominium
vacation.



A Hawaiian
condominium
vacation lets you
choose your own
place in paradise.

Whether you want a place just
for the two of you, or family and
friends, you can choose lodging
that's close to everything, or a
quaint retreat in idyllic seclusion.
Imagine a condominium with
the Pacific as your front yard or
a golf course as your backyard.
And with your own kitchen,
you create your own lifestyle,
schedule, and budget.

Call United or your Travel
Agent today about United's
"Privacy in Paradise" condo-
minium vacations on Oahu,
Maui, Hawaii,
Kauai or Molokai.
And enjoy United's
exclusive Royal
Hawaiian Service on
your way to Hawaii.



Fly the
friendly skies
of United®

Call United or your Travel Agent.

Most of the tubing underneath the
air cleaner has hoses that connect
to the carburetor. In an era when
we expect to see a lot of hoses and
wires connected to the carb, the
Honda must break all records.

If you have to lift up the carb af-
ter disconnecting all the hoses and
wires, at least you'll find all four
nuts that hold it to be accessible.
The idle speed adjuster is a screw
with a hand-turn knob; it's on the
back of the carburetor partly hid-
den under a fuel line.

The fuel filter, traditionally some-
where in the engine compartment,
is right near the fuel tank (in which
the electric fuel pump is located).
For access to change it, jack up the
car and pull the left rear wheel.

The windshield-wiper motor, on
the firewall of most cars, is under
the fresh-air intake on the Civic.
You've got to pry off the plastic
grille for access. Be careful to pry
very close to the plastic pushpins
that hold the grille to avoid cracking
the grille. To reinstall, just push the
screws down and tap them home.

The Honda cooling system is very
accessible. The fan has an electrical
disconnect very close to the motor.
If you have to pull the assembly,
the job is straightforward and easy.
Once the motor assembly is out, the
radiator also comes out easily.

The water pump is on the rear
side of the engine at the pulley end.
To change it, remove the timing
belt cover, the water pump pulley,
then finally the pump's retaining
bolts. There's no real problem.

The belt adjustment is on the al-
ternator, which is wide open on the
front side of the engine.

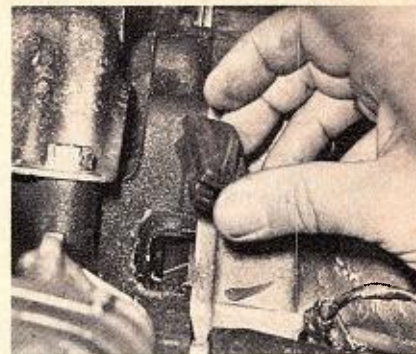
Heater hoses are easily accessi-
ble. The heater core itself is in the
duct housing under the dashboard.
You've got to drop and take apart
the duct housing to change a core,
so leave this to a professional.

The routine job in engine ser-
vice—the oil filter—couldn't be
more of a snap. The filter is on the
front side of the engine at the cen-
ter, and you could change it from
the top of the power-train compart-
ment if you wanted.

The valve cover is held by two
cap nuts on top, which proves you
can have a cover that seals, without
having eight or ten screws scattered
around the perimeter.

With the valve cover off, you can
remove the timing belt cover, which
has a lip that fits under the valve
cover.

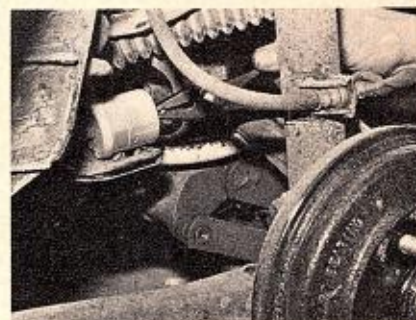
The oil pan is wide open and eas-
ily accessible, from underneath, of
course. Also reasonably open un-



One Honda idiosyncrasy is the timing
mark location: on the flywheel, behind a
rubber plug on the engine.



Disconnect the sensor's wire at its con-
nector; don't try to get the sensor out of
the air-cleaner housing.



Fuel filter is located close to the fuel
pump and tank, behind the driver's-side
rear wheel. Replacement is simple.

derneath is the exhaust system.
There's a heat shield at the mid-
point of the underbody that you
must remove for some service.

The only underbody job that
might not be obvious is the starter.
You can see it plain as day from the
top of the power-train compart-
ment. You also can see one retain-
ing bolt that you could remove easi-
ly. You know there has to be a sec-
ond bolt. But where? The answer:
underneath, threaded in from the
engine side of the flywheel housing,
at the rear side of the engine.
There are a few bolts that look like
they could be the one but, if you
look carefully, you'll see only one is
positioned so that it could be
threaded through into the starter.
You can remove it with a socket,
long extension and a ratchet. **MI**

© 1981 B & W T Co.

Kings and Box, 1 mg. "tar", 0.2 mg. nicotine; 100's, 3 mg. "tar", 0.4 mg. nicotine av. per cigarette by FTC method.



99% tar free. TM

Also available in 100's and Box

The pleasure is back.

BARCLAY

Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

HOW TO SERVICE: MAZDA



AMONG the newest of the imported transverse-engine front drives is Mazda's GLC. The car was rear drive until 1981. And as far as serviceability, the car is much like the Honda—no maze of computer wiring, no power steering and no cruise control.

But its less crowded power-train compartment has its own headache: The GLC underbody at the power-train compartment is almost totally protected by shields.

This has to mean serviceability headaches, but several steps were taken to minimize them. First, the major part of the shielding is plastic,

which means that at 40,000 miles or whatever, you're not going to be trying to realign rusted, bent pieces of metal. Of course, plastic can warp and the screws that hold the shields can rust, but at least the problems will be fewer. There is one metal shield, at the exhaust, of very thin gauge which bends easily out of shape.

So you don't have to remove a shield for every underbody job, the plastic parts are shaped so they allow easy access to the back side of the engine, where you can reach up to get to the oil filter, or remove the lower bolt on the starter and the starter itself (after taking out two bolts at the top).

There's a small hole in the front of one plastic cover for access to the radiator drain cock, and a large hole covered by a bolt-on piece of plastic that you can remove for access to the lower radiator hose clamp.

If you want to work on the ex-

haust system at the engine or take off the oil pan, however, you must remove the shield.

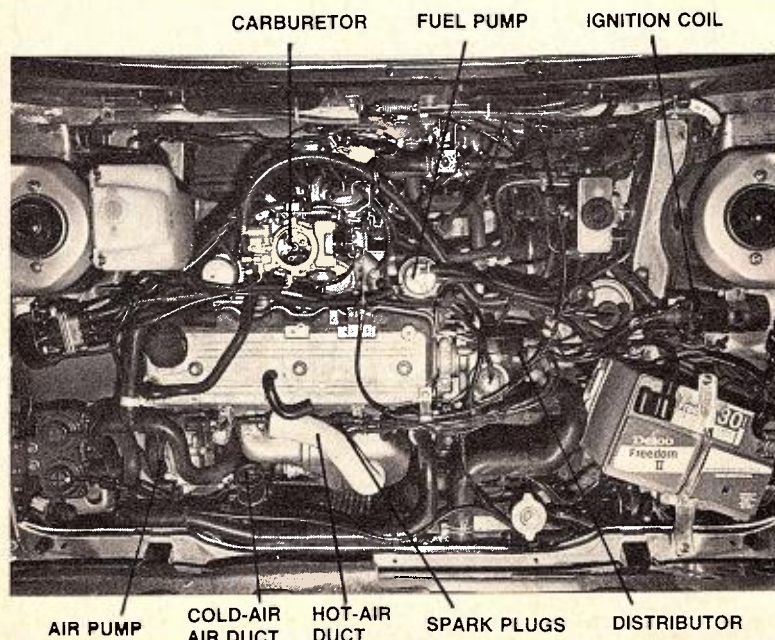
The GLC ignition system layout is similar to the Escort's. The distributor also is horizontally mounted on the flywheel end of the engine. The spark plugs are on the front side and the ignition coil is conveniently mounted on a MacPherson strut tower.

Timing marks are on the pulley end of the engine and are among the most legible I've seen. The idle speed adjuster is accessible with the air cleaner on—that's amazing—on the driver's side of the carburetor. The four nuts that hold the carburetor itself all are easy to reach. The fuel pump is right next to the carb at the top of the engine and certainly is one of the easiest around to change.

Serviceability of the cooling system varies among the items. There's an electrical disconnect close to the fan motor, and the assembly itself is not difficult to remove. Although the radiator is in somewhat tight quarters, you can ease it out. If you need some extra room, take off the air cleaner hot-air duct on the exhaust manifold, disconnect the air-pump hose and remove the air-cleaner cold-air duct.

The water pump is under the air pump on the front side of the engine. Although you have to remove the underbody plastic shield and work from underneath, it's not a bad job. There's a solid pipe (coolant return) forced into a neck on the pump. If you must disconnect it, remove the old O-ring from the pipe and install a new O-ring lubricated with petroleum jelly.

The heater hoses are well routed and pose no problem in removal or installation from one end to the other. The heater core, however, is in the duct housing. To get it out, the dashboard and steering column must first be removed, not exactly



ONLY QUAKER STATE GUARANTEES NEW CAR ENGINE LUBRICATION FOR A LIFETIME. IN WRITING!

Introducing Quaker State's Lifetime Engine Lubrication Protection Program.

Now Quaker State, the motor oil refined from Pennsylvania Grade Crude Oil, announces the most daring Protection Program available in the oil industry. It's the Lifetime Engine Lubrication Protection Program, the only program to cover your new car's engine for as long as you own it.

This exclusive program is brand new. So take a few minutes to read the following. Once you do, you'll see just how much this program can mean to you. We're sure you'll want to take advantage of it... and keep your new car staying on the road with Quaker State.

Just what is Quaker State guaranteeing?

We're not only guaranteeing the quality of our motor oil, but we're guaranteeing that Quaker State will protect so well, if your engine is ever damaged because our oil fails to protect, we'll pay for repairs or replacement of any or all of these parts: Pistons & rings, crankshaft & bearings, timing chain, rocker arms and pivots, rods and rod bearings, wrist pins & bushings, camshafts & bearings, valve stems & guides (grinding & adjustments excluded), oil pump, push rods, valve lifters, cylinder heads, cylinder lining or bore, distributor drive gear and timing gears or sprockets.

Q. What do I have to do to get this protection plan?

A. When you buy a new car, light truck or van from a participating dealer, you'll get the protection plan. To keep it in effect, all you have to do is follow these 4 steps:

1. Have all services performed by your new car dealer or other auto service center.
2. Have the oil changed according to manufacturer's recommendations, or at least every 6 months or 6,000 miles, whichever comes first.
3. Have oil filter and air cleaner replaced, and emission control system maintained, according to manufacturer's recommendations.
4. Keep all service records. These must indicate that only Quaker State Motor Oil was used with date and mileage indicated.

That's it. Now when the manufacturer's warranty ends, your Quaker State limited warranty protection begins... and continues for as long as you own the vehicle!

Q. What won't the guarantee cover?

A. It won't cover defects in manufacture, vehicles used in competition such as racing, damage caused by negligence, collision or abuse, improper installation, or engine parts not lubricated by motor oil.

Q. Suppose something goes wrong and I'm covered. What do I have to do, and how long will it take for me to collect?

A. All you have to do is notify Quaker State of a claim, by writing or calling collect. (Address and phone number are on the warranty.) Our claim representative will contact you within 24 hours. Provide the claim representative with a copy of your warranty, copies of your service records, and a statement of damage and repair cost from the dealer or any repair shop you choose. If everything is in order, the claim representative will approve the claim and make the payment.

Q. If I don't have a brand new car, can I still get the Protection Program?

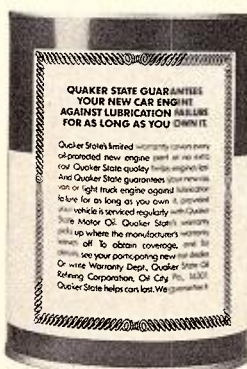
A. If your car has under 6,000 miles, you can switch to Quaker State and qualify for the Protection Program at a participating new car dealer's service department. But if your car has more than 6,000 miles, it can't qualify.

Q. If I buy a new car now, and keep it for 100,000 miles or more, will this Quaker State Protection Program be good for that long?

A. Yes. Lifetime really means for as long as you own your new car—even if you keep it for a lifetime. After all, thousands of people are already driving over the 100,000 mile mark using Quaker State without this protection program. Now, you can do it with Quaker State and have this *extra* protection for as long as you own your new car.

Q. Why is Quaker State the only motor oil with a written Lifetime Engine Lubrication Protection Program?

A. We've been making quality motor oil since 1910. In all that time, millions of people have depended on our ability to help them stay on the road. All that "on-the-road testing," plus our own laboratory tests through the years, are all the proof we need. Quaker State has the confidence in its product to put our promise of quality in writing.



STAYIN' ON THE ROAD WITH QUAKER STATE

NOW A GREAT SHINE IS EASIER TO REACH.

Black & Decker's Random Orbit Polisher takes the work out of putting a healthy gleaming shine on your car's finish.

"Random Orbit" means our polishing wheel travels in ever-changing circles—a lot like the natural motion of your hand. So it helps prevent the "swirling and burning" that can spoil your car's finish.

And now when you buy a Random Orbit Polisher, you can get a 30-foot extension cord free. It'll make it even easier to reach that great shine. Look for details on package.



B&D **Black & Decker**
CAR CARE

Offer expires December 31, 1981.

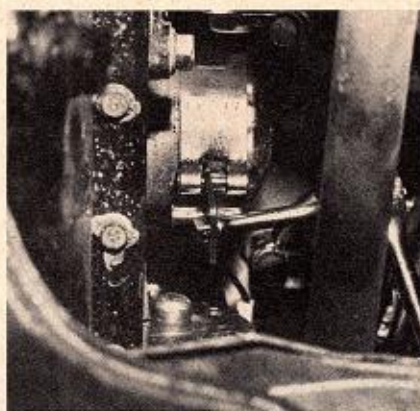
easy jobs for the weekend mechanic. Leave this one to a pro.

The belt adjustments are on the alternator and air pump. They are both accessible and obviously easy to make.

Like the Honda, the GLC has its eccentricities. One is the oil fill hole for the four- or five-speed manual transaxle; it holds the speedometer cable driven gear. To check the oil level, you must remove a retaining bolt and pull out the speedometer gear, which is the dipstick. The oil level should be at the top of the gear.

The wiper motor location, like on the Honda, is in the fresh-air intake plenum. In this case, though, access is gained by removing a plate held by five screws. With the plate off, there's the motor, wrapped in a cover.

Like VW Rabbit, Japanese cars have avoided some of the underhood complexity of American cars. As Americans find that their domestic cars have comparable gas mileage and more interior room than the Japanese competition, the Japanese may be forced to give up some room in the engine compartment to

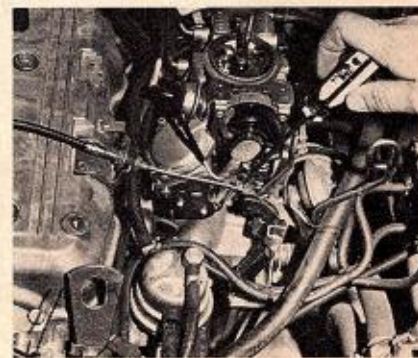


The shield ends short of the oil-filter location so that the filter is easily accessible from underneath the car.

increase interior room. The Japanese may also have to stuff some more room-robbing hardware in the engine compartment, too. And, in a move the weekend mechanic would applaud, General Motors might decide to surrender a few inches of passenger room to better compete on serviceability. Actually, the dealer's mechanic would applaud too. **MI**



Removing a cover exposes the lower radiator hose clamp. A hole in the shield nearby exposes the radiator drain cock.



Idle speed adjusting screw on the GLC is so easily reached, you can even get to it without removing the air cleaner.

J-CAR SERVICE*(Continued from page 86)*

filter sits on an adapter that makes it somewhat easier. The exhaust system is open for service from stem to stern.

Lifting the charcoal canister to change its fiber filter is easy on cars without air conditioning—undo a bracket and lift it up. With A/C, however, the accumulator sits alongside the canister and blocks easy removal. Disconnect a clamp holding the suction line. Then you can move the accumulator sufficiently to get it out of the way of the charcoal canister.

Belt adjustments on the alternator and power-steering pump are reasonable because the two accessories are at the top of the engine compartment. Even the A/C compressor, under the alternator on the front side, can be reached from underneath without great difficulty.

The air pump sits under the power-steering pump, and a belt change

or adjustment is a real have-patience operation. To take off the pump you've got to remove the power-steering pump, not exactly a quick job. The air-pump hoses are the usual snake job. The air-pump control valve is at the flywheel end of the engine, a bit buried but reachable.

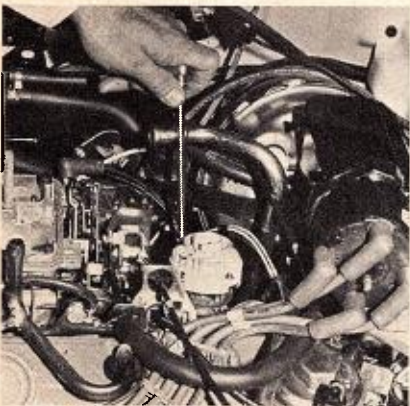
The J-Car shares two features with the X-Car that can take some of the struggle out of service: The hood opens 90° to give you a better working angle for items on the rear of the engine and enables you to

better aim a work light at the rear. Formed-in-place gaskets (in most cases a silicone) are on all applications but the cylinder head, intake manifold and exhaust gas recirculation valve. This should mean that you won't have so many gaskets to replace, as the formed type are very reliable.

The J-Car also has oversize push-rod holes, so you can lift out defective hydraulic lifters through them. This beats pulling the cylinder head, necessary on many cars. It also beats the use of a separate ac-



Distributor lock bolt (arrow) on J-car is a service disaster. It's tough to touch, let alone reach by wrench.



The distributor itself is easy to get to, making for convenient distributor cap, wire and rotor service.

New. Acrylic-Tough Protection.

USAC tests prove it. Johnson Wax guarantees it.*

ACRYLIC KIT
SOFT PASTE ACRYLIC CAR POLISH

Acrylic-Tough Protection

KIT
SOFT PASTE ACRYLIC CAR POLISH NET WT

© 1981 S. C. Johnson & Son, Inc.

*See package for details.



A little something to help blow away inflation.

It'll take more than Gabriel blasting 40% off Red Ryder prices to blow away inflation. Even so, it's a healthy puff in the right direction.

Now you can save \$9.98 off* Gabriel's \$24.95 regular suggested retail price—on each Red Ryder shock absorber you buy.

If you were to buy all four Red Ryders, you'd stash away close to \$40. Besides giving your car Gabriel's best-selling shock absorbers.

Not only are Red Ryders heavy duty all

the way, they're now *computer tuned* all the way. To your tires. To the road. And to your car. For better control at higher speeds, greater comfort at lower speeds.

So here's to the 40% Off Sale. May it explode the myth that you can't give inflation a good shock.

Gabriel
On the road ahead.

Offer expires in a flash
May 31, 1981.

Gabriel Shocks & Struts are products of Maremont Corporation.

*Based on Gabriel's suggested retail sale price of \$14.97 and the regular suggested retail price of \$24.95. Prices may vary at participating dealers.

cess cover on the side of the engine. The separate cover not only is a potential for gasket replacement, but unless provision is made for service, it may be difficult to remove.

The cooling system is among the better service areas, too. For simple flushing, the drain cock is easy to reach. The fan motor is no problem to remove and, once that's done, the radiator comes right out. If you want to disconnect the fan as a safety measure during underhood service, you'll find the connector at the motor itself somewhat tough. It's

easier to unplug at the fan relay, which is on the driver's side of the engine compartment at the front.

The water pump is a conventional mounting on the pulley end of the engine, but clearances are limited. To change it, begin by taking off the alternator, an obvious procedure. Then take off the four screws that hold the pump pulley. Finally, unbolt the pump and there should be just enough clearance to pull it forward, then up and out.

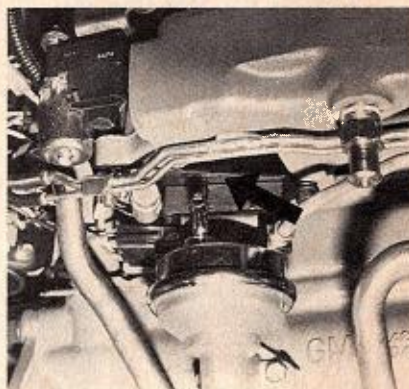
The heater core is under the dashboard, covered by a duct hous-

ing panel. I didn't get a chance to actually check out removal, but engineers said the panel was no more difficult to remove than that on the X-Car, which is very easy. Once the panel is off, there's the core. Disconnect the heater hoses in the engine compartment (not difficult) and the core comes right out.

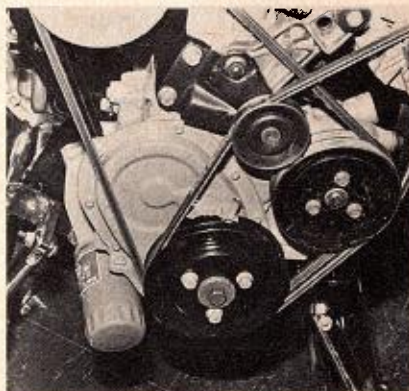
Preliminary serviceability reports on the J-Car said the starter was so easy it could be reached from the top of the engine compartment. Things closed up a bit as the prototype were developed. On my evaluation car, the only way to get at the starter was from underneath, after removing a catalytic-converter protective shield.

This converter shield and the starter must come out and you must drop the exhaust pipe to remove the oil pan.

There's one very simple job on the Chevy version of the J-Car that could be a momentary puzzler: removing the molding to change a headlight. There are no screws in sight. It's all part of a design for neatness and to eliminate the possibility of rusting screws from exposure. Lift the hood and you'll see the molding has L-brackets that extend inward to a front support in



The ignition coil (arrow) is sandwiched underneath the intake manifold and above the fuel pump. It's a toughie.



The oil filter on cars with the automatic is mounted on an adapter to make for good under-the-car accessibility.

New from NRI! 25" color TV that tunes by computer, programs an entire evening's entertainment.

DIAGONAL

Just part of NRI's training in servicing TV, stereo systems, video tape and disc players, car and portable radios.

Only NRI home training prepares you so thoroughly for the next great leap forward in TV and audio...digital systems. Already, top-of-the-line TV's feature digital tuning, computer programming is appearing, and new digital audio recording equipment is about to go on the market.

NRI is the only home study school to give you the actual "hands-on" training you need to handle servicing problems on tomorrow's electronic equipment. Because only NRI includes this designed-for-learning, 25" diagonal color TV with electronic tuning, built-in digital clock, and computer programmer as part of your training. With this advanced feature, you can pre-program an entire evening's entertainment...even key lock it in to control children's viewing.

Exclusive Designed-for-learning Concept

The color TV you build as part of NRI's Master Course looks, operates, and performs like the very finest commercial sets. But behind that pretty picture is a unique designed-for-learning chassis. As you assemble it, you perform meaningful experiments. You even introduce defects, troubleshoot and correct them as you would in actual practice. And you end up with a magnificent, big-picture TV with advanced features.

Also Build Stereo, Test Instruments

That's just a start. You demonstrate basic principles on the unique NRI Discovery Lab[®], then apply them as you assemble a fine AM/FM stereo, complete with speakers. You also learn as you build your own test instruments, including a 5" triggered sweep oscilloscope, CMOS digital frequency counter, color bar generator, and transistorized volt-ohm meter. Use them for learning, use them for earning as a full- or part-time TV, audio, and video systems technician.

Complete, Effective Training Includes Video Systems

You need no previous experience of any kind. Starting with the basics, exclusive "bite-size" lessons cover subjects thoroughly, clearly, and concisely. "Hands-on" experiments reinforce theory for better comprehension and retention. And your personal NRI instructor is always available for advice and help. You'll be prepared to work with stereo systems, car radios, record and tape players, transistor



radios, short-wave receivers, PA systems, musical instrument amplifiers, electronic TV games, even video tape recorders and tape or disc video playbacks.

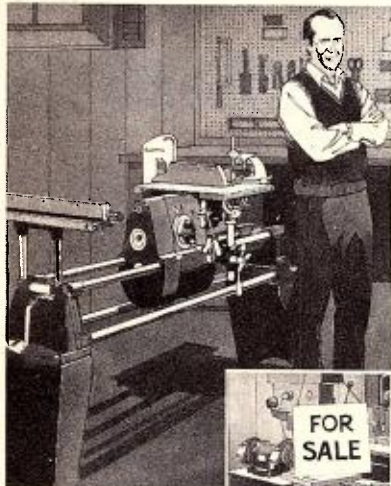
Send for Free Detailed Catalog... No Salesman Will Call

Mail the postage-paid card today for our free 100-page catalog with color photos of all kits and equipment, complete lesson plans, convenient time payment plans, and information on other electronics courses. You'll also find out about NRI's new Computer Technology Course that includes your personal microcomputer. Or Complete Communications with 2-meter transceiver. If card has been removed, write to:



NRI Schools
McGraw-Hill Continuing
Education Center
3939 Wisconsin Ave.
Washington, D.C. 20016

Jack McAlister had \$12,000 worth of power tools . . .



... here's why he sold them.

"My shop was equipped with commercial tools in which I had an investment of \$12,000 or more. I sold all my machines at a nice profit, and purchased one Mark V. I can do anything I was doing on all the machines, have a lot more room, and have several thousand in the bank. What more could I ask for?"

Jack McAlister,
Tucker, Ga.

Jack discovered something that a lot of woodworkers at all levels already know. You don't need a shop full of expensive power tools to do just about any job imaginable. All you need is a Shopsmith MARK V.

The MARK V is a complete home workshop in a single compact unit that takes less space than a bicycle. It includes the five basic power tools you need — table saw, lathe, drill press, disc sander, and horizontal boring machine.

Find out what Jack McAlister and hundreds of thousands of other owners already know about the Shopsmith MARK V . . . It's the single piece of equipment that can actually replace \$12,000 worth of power tools — yet costs only a fraction of that amount.

Send for Your Free Information Today!

Fill in and mail the coupon for all the free facts on this amazing 5-in-1 tool — the MARK V. The information is absolutely free and without obligation. Send now!



Shopsmith Inc.

The Home Workshop Company
Dept. 352S
750 Center Drive
Vandalia, Ohio 45377

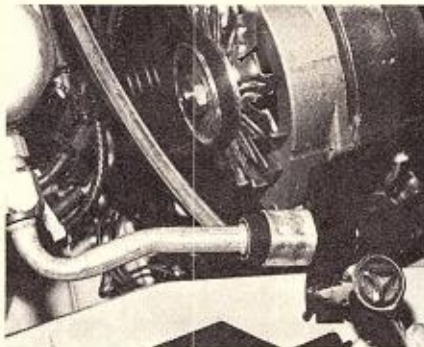
Yes! Please mail me your FREE Information Kit on the Shopsmith Mark V. I understand there is no obligation.

Name _____
Address _____
City _____
State _____ Zip _____

line with the radiator. Remove the screws there and pull the molding forward and out. Pontiac and Cadillac versions of the car have the usual-for-GM exposed Torx-head screws holding the molding.

The J-Car is being introduced as a luxury subcompact. To power all the vacuum accessories and emission controls, there's an electric vacuum pump to supplement engine vacuum, which may be inadequate at times. If the accessories seem to run short of vacuum (probably most noticeable during A/C usage), check the pump and its connectors. The pump is in the driver's side fenderwell, beneath the battery.

The J-Car's compartment is one of the tightest I've seen but, since every effort was made to beat all the competition in interior roominess in a car that's only a half-inch longer than the Honda Accord, something had to give. Obviously it was the size of the power-train com-



Changing the filter of the charcoal canister requires that you disconnect an A/C line and move the accumulator.



To disconnect the radiator cooling fan, go to its relay, mounted behind the battery and above the air intake duct.

partment. However, because the J is coming on stream as a luxury model, power steering (standard on some deluxe models) and air conditioning were given the same weight in layout as other belt-driven accessories. This results in a package that when fully equipped is well short of a dream, but one which a patient d-i-yer can handle. **MI**

X-CAR SERVICE

(Continued from page 88)

put the socket with universal joint attached on the spark plug. Then install either extension so it goes under the air injection pipe. Finally, put on the ratchet. After installation of a new plug, you may have to pry off the ratchet first with a screwdriver.

For the center plug, put the socket with universal joint attached on the spark plug, then install the long extension so it goes under the air injection pipe. Put on the ratchet, then straighten the universal joint to minimize the operating angle.

For the plug at the pulley end, assemble the socket, universal joint and short extension. Install the socket on the spark plug and move the short extension under the air injection pipe. Then put on the ratchet.

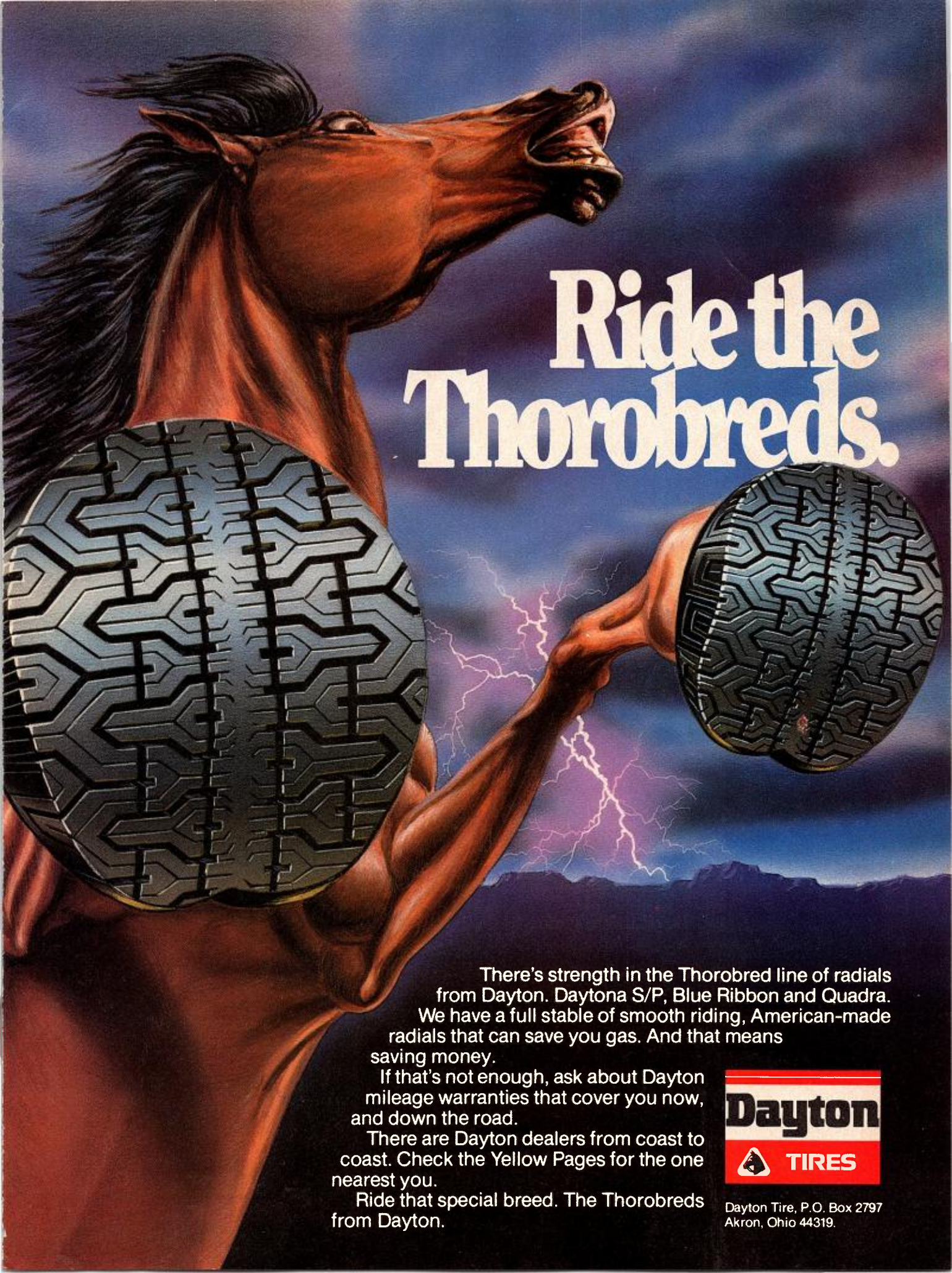
There is also adequate room for a compression test, using a gauge with a hose that threads into the spark plug hole.

Other tune-up items are easier. The distributor is between the banks on the V6, next to the carburetor. You can get to the plug wires, distributor cap, ignition coil (installed on the cap), innards of the distributor and the timing lockbolt with no problem. The timing marks are on the pulley end of the engine and easy to see. If you are using a timing indicator with an electromagnetic probe (an item for the advanced weekend mechanic), you'll find no problem pushing the probe into the holder because the holder is canted forward on '81 models. Getting the typical probe into the holder is a real problem on '80s.

Another important routine maintenance item is the oil filter. It's on the front side of the engine, easily accessible from underneath the car.

The cooling system is a generally passable area. You can reach the radiator drain cock from underneath with no problem. Although you can't disconnect the fan motor easily at the fan itself, its relay is wide open at the passenger side of the front support. There, the fan motor bolts all are accessible, so the fan can be taken out easily.

Once the fan is out, radiator removal is a reasonably simple procedure. But there are two special steps: First, you must disconnect the hood-release mechanism. Scribe alignment marks before you do, so when you reinstall it you won't have to make any adjustments. And second, you have to disconnect the



Ride the Thorobreds.

There's strength in the Thorobred line of radials from Dayton. Daytona S/P, Blue Ribbon and Quadra. We have a full stable of smooth riding, American-made radials that can save you gas. And that means saving money.

If that's not enough, ask about Dayton mileage warranties that cover you now, and down the road.

There are Dayton dealers from coast to coast. Check the Yellow Pages for the one nearest you.

Ride that special breed. The Thorobreds from Dayton.



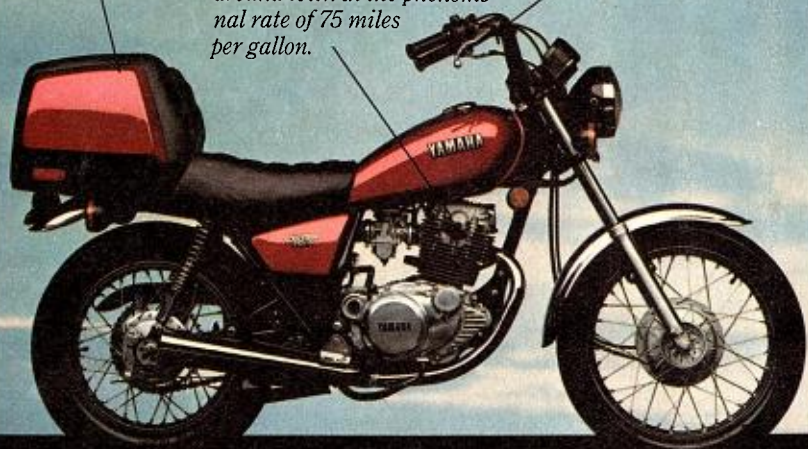
Dayton Tire, P.O. Box 2797
Akron, Ohio 44319.

IT COMES WITH A TRUNK AND RUNS ON PEANUTS.

The Exciter 250T comes with a nice roomy compartment to stash your stuff. It's also removable.

A super dependable 249cc four-stroke will whisk you around town at the phenomenal rate of 75 miles per gallon.

The electric starter makes starting as easy as pushing a button.



YAMAHA
THE WAY IT SHOULD BE.

Mileage figures based on EPA testing, for city riding. Your mileage may vary depending on the way you ride. Rear view mirrors standard equipment. Always wear a helmet and eye protection.

sheet-metal braces and engine-steady strut at the top of the radiator. Then loosen the strut at the engine and flip it back out of the way.

The water pump also requires special attention, although it's moderately accessible. Some of the bolts that hold the water pump also hold the timing cover. When the pump is pulled away, the timing cover may be pulled away, too, allowing some coolant to get into and contaminate the oil. GM markets a special bracket (Tool No. J-29176, sold through dealers) that bolts to an existing

tapped hole in the cylinder head and holds the timing cover in place. You probably can fabricate an equivalent tool from bar stock.

The heater hoses are a fair struggle at replacement time. The heater core, however, is a gem. Remove an insulating pad under the dash to expose a cover plate on the duct housing near the center of the car. Remove this cover (it's easy) and there's the heater core, held by wide-open screws. Get underneath the car and disconnect the heater hoses from the core nipples (there's

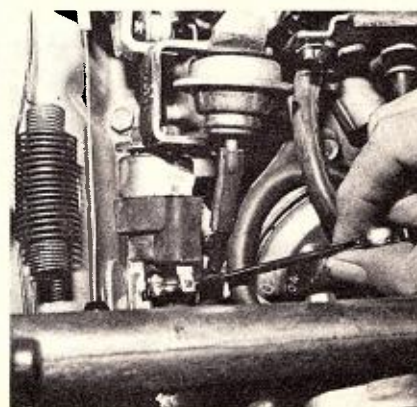
reasonable access to the hose clamps). Then pull the core out.

Belt adjustments are fair. On cars without air conditioning, the alternator is at the top, so its belt is easy. With A/C, you've got a reasonable shot at the compressor, mounted at the top. But the alternator is now underneath it, and you've got to get under the car for the alternator-belt adjustment. Adjusting the belt on the air pump is no problem.

The belt for the power-steering pump (on the rear side of the engine), however, is the only real headache, as there are bolts to loosen on top and bottom. The first time you do the power-steering belt, take off the air-control valve, which projects from the air pump, remove the blower motor and disconnect the heater hose from the water pump and swing it out of the way. With all this done (time-consuming but not difficult), you'll have a reasonable view of all the bolts that hold the pump to the bracket. If you remember the bolt locations for the future, you'll be able to do the belt adjustment without taking off anything, though it will be somewhat of a struggle to reach the



Getting to the rear three spark plugs on the V6 is quite possible with the correct combination of tools.



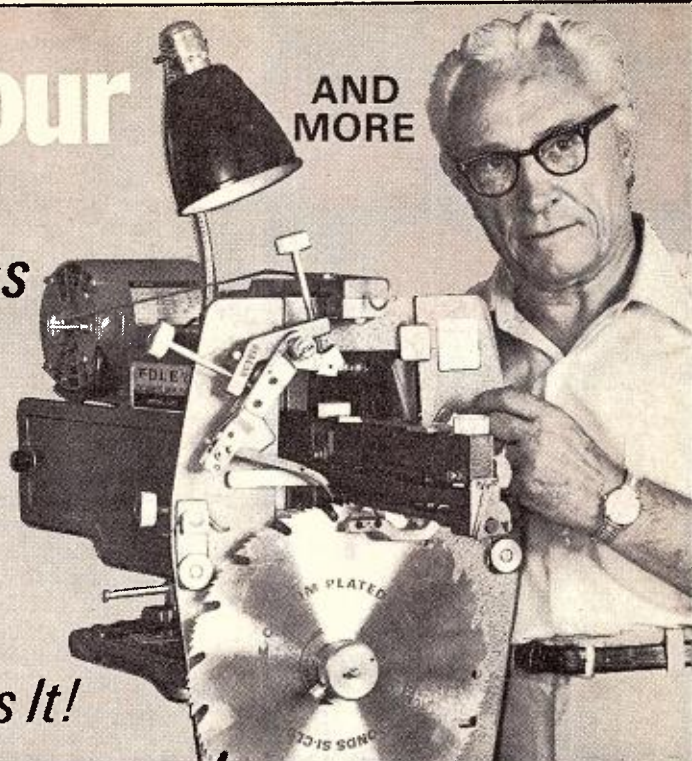
Some V6 engines have computer-controlled idle speed; for others, curb idle is set at the back of the solenoid.

Earn \$8 an Hour

In The Evening or on Weekends in a Business of your own!

Sharpening Saws & Tools

For Industry and Homes! Every Neighborhood Needs It!



AND MORE

Sharpening is Big Business ... and Profitable Too!

Work part time, full time, right at home. No layoffs. No strikes.

This can be one of the most important decisions you ever make

Going into business for yourself can be the most exciting and rewarding decision you're likely to make in your lifetime.

Owning your own business brings you a sense of independence. You're the boss, setting your own work hours. Your own effort builds the business for yourself and your family. You can achieve great satisfaction and profits, if you choose and manage your business wisely. That's why so many men, just like you, are cashing in on the big profits to be made in this fast-growing service field.

The sharpening business allows you to get started with only a minimum investment, requiring little space and effort for a successful operation. It lets you build and expand as fast, or as slowly as you like. You pocket most of the money you take in, because there are exceptionally high profits with no investment in merchandise.

If you need only \$200 or \$400 extra income each month, a sharpening business is ideal for spare time. The additional dollars can be SPENT for more of the good things of life. Or they can be SAVED in a rainy-day fund that the family can bank on.

More sharpening businesses are needed every year

As original equipment continues to climb in cost, owners are becoming more concerned that the equipment be maintained so that it performs like new. This means more companies, contractors, carpenters and home owners are having their old saw blades and tools resharpened many times, where in the past, they would have replaced them with new blades or tools. This is where you can step in with the much needed service of sharpening saws and practically any kind of tool.

Read What These Foley Shop Owners Say:

Shop will gross \$40,000 ... likes being independent

"I worked in various industrial jobs for years, and always wondered if I could make money for someone else, why I couldn't do it for myself. So after losing my regular job, I opened my Foley sharpening shop in the basement of my home. I only had a minimum of cash to start with, but Foley financed the balance. My shop will gross over \$40,000 this year, and I like the feeling of running my own shop without answering to someone else."

William Wescott
Willoughby, Ohio 44094



Husband and wife have a going spare time shop

"I'm a construction foreman, and my wife is a nurse's aide. Our Foley shop fits in nicely with our regular jobs, and we earn extra money. Our sons help out too, so ours is a real family business."

"I'm still too young to retire, but when I do I'll have a very good business built up. Foley equipment helps us to do good work and brings customers back with more jobs on a regular basis ... we have a lot of repeat business the year around."

Victor Kosloski
Sturgis, Michigan 49091



This FREE BOOKLET has helped thousands

Thousands of good men have been inspired by this fact-filled book into making that first important step of starting their own business. It can be yours just for the asking. Right now, while this is still fresh in your mind, fill-in the coupon below. We will send your FREE copy of "Opportunities in a Sharpening Business of Your Own". There is absolutely no obligation and there are no franchise fees in starting your Foley Sharpening Business.

CLIP OUT AND MAIL THIS COUPON TODAY

If coupon has been removed, just send name and address to:

Foley Manufacturing Company
5116 Foley Building
Minneapolis, Minn. 55418
or call Toll Free 1-800-328-7140
(Except in Hawaii or Alaska)

Foley Manufacturing Company
5116 Foley Building
Minneapolis, Minn. 55418



☐ **YES**, I would like to receive complete details about how I can easily start a profitable, Foley-equipped sharpening shop. Please rush me your FREE booklet, without any cost or obligation, that gives me full details on how I can quickly start my own business.

NAME _____

ADDRESS _____

CITY _____

STATE _____ **ZIP** _____

HOW TO

SAVE ENERGY

Energy saved is money saved. A good and easy way to start saving is to seal your home with Red Devil caulks and fillers—there's one for every caulking need. Pay special attention to frames of doors, windows and air conditioners, the foundation, and cracks in mortar

and concrete. Ask your dealer for a free copy of Red Devil's brochure, "How To Save Energy", or send a stamped, self-addressed, business-size envelope to: Red Devil, Inc.,

Box 155E, Union, NJ 07083.



Red Devil

Red Devil, Inc., Union, NJ 07083

WE'RE SOLD ON QUALITY.

power-steering pump's bolts.

Routine fuel-system adjustments are eliminated on most GM models for 1981. However, my V6 evaluation car had idle-speed adjustments on a solenoid (curb idle) and a linkage screw (low idle). The change is being made to automatic control through the computer, so your car may have an idle-speed control motor instead. Both adjusters, however, are accessible with the air cleaner off.

The carburetor retaining nuts aren't exactly wide open but they aren't buried, either. A couple of them require a socket plus a universal joint held at an extreme angle.

The fuel pump is next to the oil filter and accessible from underneath after removing a shield.

Other items you have to get from underneath—the starter, oil pan and exhaust system—all are passably accessible.

To get the starter out, you must remove a plastic shield for access to one of the retaining bolts. To drop the oil pan, you must remove the starter. You also have to drop the exhaust crossover pipe and, on manual transmission models, disconnect the front engine mount and raise the engine almost an inch.

The exhaust system is generally easy to get at, except for one of the nuts that holds the Y-pipe to the exhaust manifold on the engine's rear side. The nut closest to the engine is partly obscured by a shield, but you can work past it with a socket and extension.

All in all, the V6 X-Car is a reasonable-to-service package, even with the popular accessories. Not quite the same story for the Four.

FOUR-CYLINDER

The four-cylinder's spark plugs are on the front side of the engine and there's never been a problem about replacing them or making a compression test. But that's where the ignition system advantage over the V6 ends.

The Four's distributor is on the rear side of the engine, mounted at a poor angle for service. The cap is held by two spring-loaded locking rods. They're in such tight quarters you'll only be thankful that there aren't four of them, as on the other GM engines.

If you have small, strong hands and a stubby screwdriver, you can reach in and disengage them. On cars equipped with air conditioning, what little room there is is partly taken by the A/C accumulator, a large canister. Getting off the cap is



The low idle on noncomputer cars is set at a screw on the throttle linkage, accessible with the air cleaner removed.

not really the whole problem; holding the cap in the proper position while you reengage the locking rods during reinstallation can be even tougher. Take advantage of the 90° hood opening on the X-Car, aim and good light and positively locate the locking rods. Then reach down and do it by braille.

The distributor lockbolt also is buried down there. You can, if you push aside some wires in the area, actually see the bolt if you're properly draped across the power-train compartment, have the hood wide open and have a good light aimed down. Once you find it, you need a C-shaped distributor wrench to loosen it.

The ignition coil that was built into the distributor cap in '80 is a separate part in '81. Its location at the flywheel end of the engine near the distributor isn't bad, but on cars with cruise control the diaphragm bracket blocks good access.

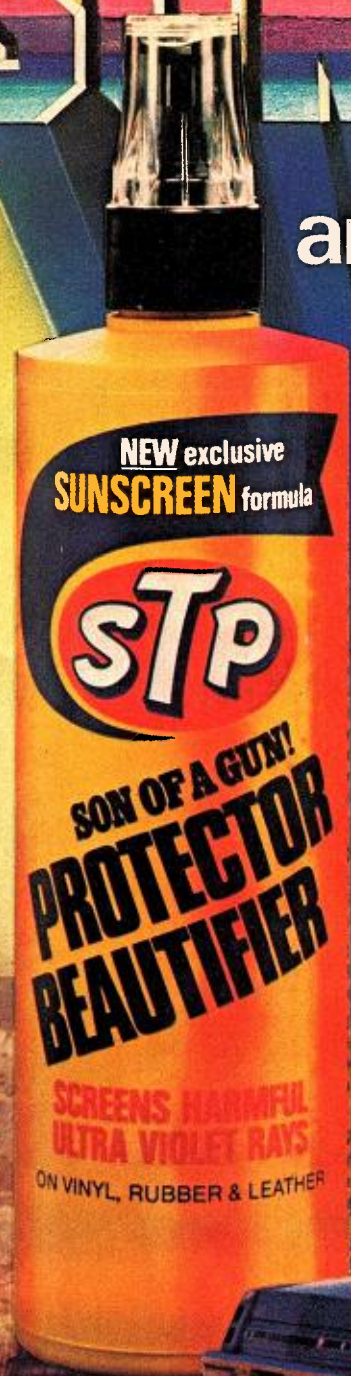
There is a wire from the distributor cap to a convenient location under the hood for a tachometer connection. But it can be tough to find in the maze. And although coil access was improved by installation of the separate coil, the 1980 model actually provided easy access to the tach terminal in the distributor cap. If you have any trouble with tach connections (on this or any other car), get a secondary tachometer, which is one that runs off a spark-plug (secondary) wire. It's always easy to connect.

The oil filter is another item that doesn't win any serviceability plau-

STP's New SON OF A GUN with

SUNSCREEN

an Exclusive Formula*

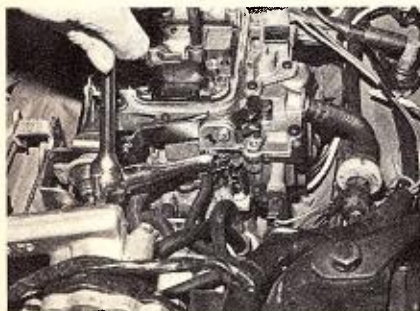


New Triple Silicone
formula provides
Longer Lasting
Shine and Protection

Now with
Fresh Clean Scent

mits on the Four. It's on the rear side of the engine and, though you can reach it from underneath, it's not easy.

The fuel pump is right next to the oil filter, and getting it out is a bear. You can struggle to loosen and remove the two bolts that hold the pump to the engine, but the room is so limited you probably would not be able to reach up and disconnect the fuel lines from it. To provide some working room, you could take off the air pump, alternator and oil filter and reach over the top of the engine to get to the fuel lines. Of course, you might be lucky and never need a new fuel pump. Hope



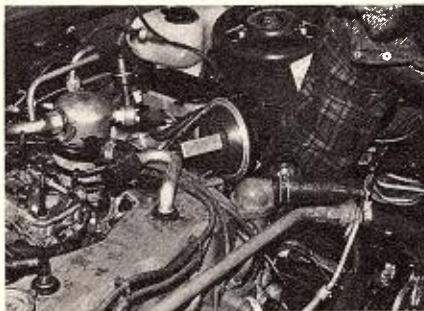
The carb mounting nuts on the V6 are buried, but the right socket, extension and universal joint combo gets them.

and pray that you never do.

The hydraulic lifters are another item for which you should pray for longevity (you can help by changing oil frequently). To get to them, you've got to pull the intake manifold (definitely not a job you'll enjoy) to get to the pushrod cover underneath it on the rear side of the engine.

The oil pan also is not fun and games. In fact, the best thing you can do is leave it to a pro. Fortunately, like the V6, it has a formed-in-place silicone gasket, which has the potential to be leak-free for a long time.

As with the V6, Pulsair is gone on

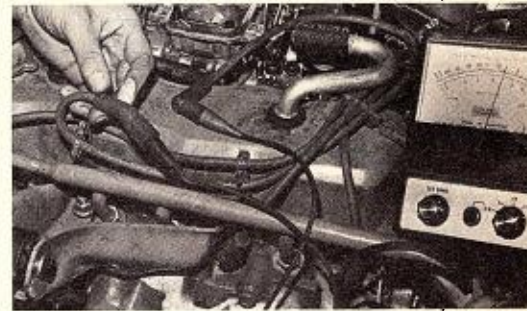


Getting to the distributor on the Four is a difficult stretch. Even getting off a plug wire is a braille job.

the Four for '81. But in this case, the results aren't as good. The air pump that replaces it is over the alternator, which was moved down on the rear side of the engine. You can reach the alternator-belt adjuster, but the only way to test the alternator (without removing it) is with the air pump removed. And even then you're still working in tight quarters.

The power-steering pump is on the front side of the engine, accessible from the top on cars without air conditioning, from underneath without great difficulty on those with A/C.

The water pump is mounted be-



With a struggle, it is possible to get spark-plug wires off at the distributor and plug, to test or replace.

HOW TO USE THIS TO TRIM

Seven years ago, the Weed Eater string trimmer revolutionized lawn and yard care. Today it's still the number-one selling brand of trimmer in America. Simply because it works hard. It's priced right. And it holds up. What's more, Weed Eater's got a complete line of both gas and electric models to handle all sorts of trimming and edging jobs. And now you can use one to save **WEED EATER**® some money.



tween the power-steering pump and the A/C compressor (or just under the power-steering pump on cars without A/C). At worst, you have to unbolt and lift the A/C compressor to get to it.

All '81 GM cars have digital computers, which adds a maze of wiring to the power-train compartment. It also, however, contributes to better gas mileage and smoother engine operation.

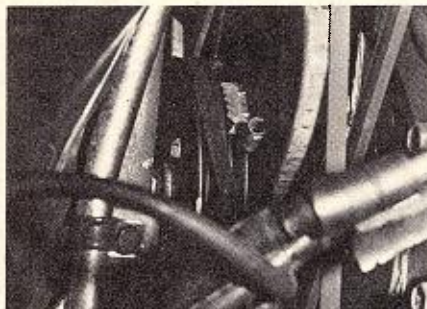
The computer is programmed to do some diagnosis of its sensors and operating hardware (motors and solenoids). This sort of programming is in its infancy, but it can help. If the *check engine* light comes on, it



GM distributors have a special terminal on them to connect a tachometer or other test meter, for easier service.

means a fault has gone into the computer memory. To find out what it is, locate a diagnostic connector under the dash and bolted to the bottom of the dash.

The connector has five terminals, with two at one end the ones you want. Find the terminal at the end with a black wire, and a black/white wire in the terminal next to it. Insert an open paper clip into the two terminals, turn on the ignition and watch the *check engine* light. It will pulse out trouble codes. The computer system is warranted for five years or 50,000 miles, so the work is up to the dealer. However, if you follow the diagnosis chart in



Timing marks on the Four's front pulley are easy to read, the probe holder easy to reach. But timing is tough to adjust.

the service manual, you will at least have an idea of what's wrong.

The four-cylinder X-Car gets somewhat better gas mileage than the V6, so it's been a popular choice among X-car buyers. If you're a weekend mechanic and insist on the Four for the economy, you should be prepared to give up such extras as A/C, power steering and cruise control. Leaving them off won't turn the Four into a weekend mechanic's dream, but at least you won't end up with such a terribly clogged compartment. And some of the money you save by skipping the accessories will help pay the garage bills for the jobs you don't do. **MI**



Use an open paper clip to jump across the two end terminals of the under-dash connector to start computer self-diagnosis.

\$10 OFF THE PRICE OF THIS.



Just buy any Weed Eater Brand string trimmer between April 1 and August 15, 1981, and we'll give you a \$10 refund when you buy the hot-selling Weed Eater Brand Home 'N Yard Power Blower. The powerful new machine that uses a hundred and twenty-five mile an hour blast of air to breeze through leaves, grass, dirt—even light snow. In no time, with no sweat.

So cut yourself in on another great Weed Eater deal. But hurry. Offer **WEED EATER®** ends August 15, 1981.

Beaird-Poulan/Weed Eater Division, Emerson Electric Co., P.O. Box 9329, Shreveport, La. 71109

«TEN DOLLAR REFUND» HOME 'N YARD POWER BLOWER

MI

Name _____

Address _____

City _____ State _____ Zip _____

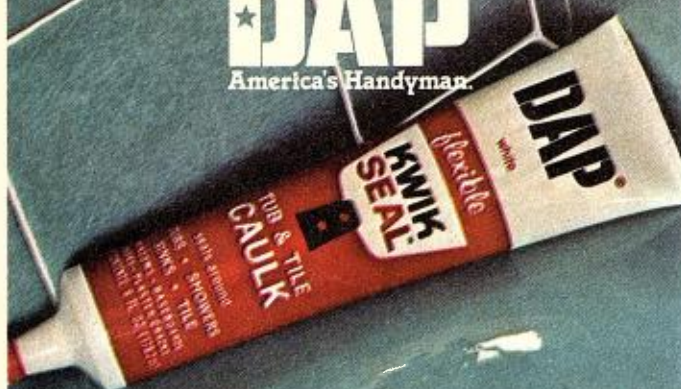
To receive a \$10.00 refund check from WEED EATER return this coupon, along with the original bills of sale with purchase price circled for both a WEED EATER Brand string trimmer and a WEED EATER Brand power blower purchased between April 1, 1981 and August 15, 1981. This coupon and the sales slip from each product may not be mechanically reproduced and are not transferable. Good only in U.S.A. and Canada. Void where prohibited by law. Limit one refund per WEED EATER string trimmer power blower purchased. Rebate requests that are illegal or that contain materials altered in any way are automatically void. Your request for \$10.00 refund must be postmarked no later than September 1, 1981. Please allow 6 weeks for refund.

Return to: WEED EATER, P.O. Box 725, Dept. WE, Lubbock, Texas 79491

RING AROUND THE TUB.

Kwik-Seal Tub & Tile Caulk is a handyman's favorite solution to sealing around tubs, sinks and showers. Also grouts and replaces tile, fills cracks and joints in walls, ceilings and wood trim. Dries fast. Stays flexible. Won't yellow. Resists mildew.

DAP
America's Handyman.



© 1980 DAP Inc. DAP and Kwik-Seal are trademarks of DAP Inc., Dayton, Ohio 45401. Subsidiary of Plough, Inc.

the linkage open, you've got a clear shot at it.

Changing a fuel pump is a simpler job on the Omni/Horizon than on the Rabbit because the pump is a mechanical unit under the hood, not an electric pump under the body at the gas tank. The mechanical pump mounts in the space occupied by the temperature compensator for the Rabbit fuel injection.

The Omni/Horizon cooling system is much like the Rabbit's from a serviceability standpoint. Chrysler, however, has gone one better: The water pump is on the driver's-side bottom of the engine (as on VW), but the Omni/Horizon thermostat is in a housing at the top of the engine, a much more convenient location.

Removing the water pump, however, is a bit of a bother because there's an air pump under it. To change the water pump, take off the air pump and bracket. This is not hard, but it adds to the time required to do the job. However, the fan's electric motor, radiator and all cooling-system hoses are easy to service. On '78 through '80 models, the Omni/Horizon had a fan shroud—but it's gone on models without air conditioning for '81, simplifying radiator removal.

Although the heating-duct housing is Chrysler's own design, heater-core replacement requires dropping the housing. It's a job comparable to that on the Rabbit and one, therefore, that should be left to a professional.

Belt adjustments on Omni/Horizon are much improved over '78 through '80 models. On those earlier cars, you needed a special tool (along with

OMNI/HORIZON SERVICE

(Continued from page 92)

open) and push the air cleaner aside. You shouldn't have to pull the housing to provide enough clearance, unless the usually easy-to-remove thermostatic air-cleaner flex duct really sticks on.

The carburetor idle-speed adjuster is on a vertically mounted solenoid at the top of the carburetor. Chrysler thoughtfully has placed an adhesive decal, with an arrow and a drawing, on the top of the air cleaner. This arrow points to the solenoid, which is not visible when the air cleaner is in place. Guided by this arrow, you should be able to locate the solenoid's screw adjuster and make your adjustment without pulling the air-cleaner housing, which is a rare thing on late-model cars.

You may want a look at the solenoid adjuster the first time you have to do this. You don't have to remove the air-cleaner housing for only a look. Just disconnect the housing from the intake manifold and lift it out of the way. You also might want a look at the solenoid to be sure its plunger is touching the throttle linkage—proof positive the engine is at curb idle and ready for a timing check.

You also can move the air-cleaner housing aside for carburetor removal. None of the carburetor retaining nuts is exactly wide open, but you can get them all with ordinary wrenches. The one on the driver's front-side looks impossibly buried, but the obstruction is throttle linkage. If you hold

THIS IS A STICK-UP.

DAP Panel Adhesive is the quick and easy way to stick up wood paneling, drywall and trim. Also perfect for replacing roof shingles, and installing stair treads, risers, subflooring and thresholds. Bonds solidly to wood, plaster, sheet rock and metals. Long lasting. Heatproof. Waterproof.

DAP
America's Handyman.

© 1980 DAP Inc. DAP is a trademark of DAP Inc., Dayton, Ohio 45401. Subsidiary of Plough, Inc.



a ratchet) to properly apply tension to the alternator/water pump belt. For '81, there's an adjuster that requires only a wrench to correct tension. It features a two-piece bracket with a screw adjuster. To make the adjustment, first loosen a lockbolt that holds the two bracket sections together. You can reach it from the top (or from underneath) on models without A/C. With A/C, it's accessible through a hole below the bumper (just remove a plastic plug and insert a socket with a long extension).

Once the lockbolt is loose, you can turn the screw adjuster. With the same long extension, go through an access hole in the front sheet metal, adjacent to the top of the power-train compartment. Turn the



Spark-plug wires are disconnected from distributor cap by squeezing spring-clip tangs and pulling on outside nipple.



Tough-to-reach valve-cover screw is accessible after you unscrew air-cleaner housing and push it to one side.

THIS COULD BE THE START OF SOMETHING BIG.



Here's a little something every R.V. should have: A Honda EM-500 portable generator. Its 500 (max.) watts of power make it perfect for charging batteries and running camping accessories. And it's a compact 40 lbs., so it fits into the

smallest storage spaces. It starts easily, and needs no fuel pre-mixing.

To find the Honda Generator dealer nearest you, just look in the Yellow Pages, or call toll-free 800-228-2056, ext 640. In Nebraska, 402-571-4900, ext 640.

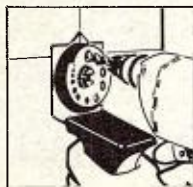
IT'S A HONDA

© 1981 American Honda Motor Co., Inc. For optimum safety and performance, we recommend that you read the owner's manual before operating your Honda Power Product.

SUPER DOERS QUIZ #1

How can you drill without 'walking'?

Drills horizontally or vertically to an exact right angle.



Drill storage in handle.

Rubber backing keeps drill from slipping, scratching, walking.

Rotate dial to drill size; lock and drill straight, on-the-mark. Accommodates all 13 popular drill sizes up to 1/4".

STANLEY DRILL GUIDE

Want more reasons why Super Doers can't do without Stanley? We've got a book full of them. Send \$1 for Stanley's fact-filled catalog to: Stanley Tools, P.O. Box 3000A, New Britain, CT 06050.

STANLEY
helps you do things right.®



Warning - Protect your eyes
- Wear safety goggles
when using power tools

© 1981, Stanley Tools, Division of The Stanley Works. Super Doers is a trademark of Stanley Tools



Sometimes It Pays To Have Nosey Friends

... friends that give you a firm grip on fine work in tight places. That make it easy to reach the hard to reach. Long nose pliers by CHANNELLOCK. Slender, perfectly mated jaws with no side wobble. Sharp, hand honed cutters. Beautiful high polished finish. Blue dipped plastic comfort grips. Quality in every detail (at no premium in price). CHANNELLOCK. Be sure that name is on the pliers YOU buy.

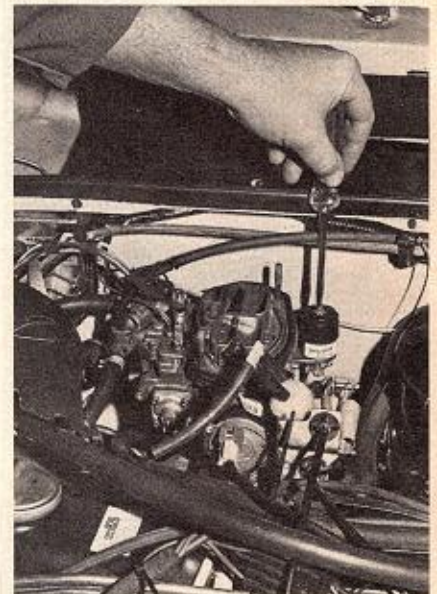
CHAN NEL LOCK

CHANNELLOCK, INC. • Meadville, Pennsylvania 16335

Meet The Rest Of The Family. Send For Free Catalog.



Large, bright arrow-shaped decal attached to air-cleaner housing points to unseen solenoid screw that adjusts idle.



Remove air-cleaner housing and you can spot solenoid screw that controls the idle adjustment that decal points to.

screw until belt tension is correct. Then tighten the locknut.

If you have to remove the alternator for service, it comes out through the top of the power-train compartment. On cars without A/C first you have to remove a brace above it; with A/C, you must unbolt and lift up the compressor.

The A/C compressor location at the top front of the compartment makes A/C belt adjustment easy. To adjust the air-pump belt, loosen the bolts that hold the idler pulley and

move the pulley to apply tension. You'll have to work underneath, however, to replace the belt. Remove the passenger-side splash shield for access to the pump.

Like most transverse-engine cars, the air-pump hoses include metal tubing sections. The routing of the air pump lines on Omni/Horizon is snakelike, though it's better than on many other cars.

The power-steering belt is one of those from-the-top-and-underneath propositions. The upper bolt is one

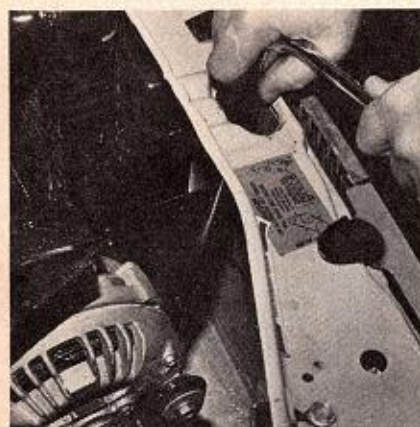
that goes through the slotted adjusting bracket, the lower one is the pivot bolt. Although you have to get underneath, there's no access problem. The power-steering-pump bracket has a square hole for a 1/2-inch ratchet. That simplifies setting tension.

Access to most underbody components is good. The oil filter, as on VW Rabbit, is so wide open you could even change it from the top of the compartment. The oil pan is well exposed so there's no problem changing a gasket or getting into the bottom end of the engine.

The starter, as on VW manual-transmission models, is on the front side and wide open. With the auto-



Alternator adjuster lockbolt is loosened by inserting a socket with long extension through hole in the car's bumper.



Once lockbolt is loose, you can go through top access hole with same setup and adjust belt tension.

matic transaxle, the starter is on the rear side and partly covered by a shield. Remove the shield and then struggle a bit to get the starter bolts out.

The exhaust system is clear for service all the way. Although some doughnut hangers are used, they are not all the easy pry-off type used on the K-Cars.

Omni/Horizon was the first transverse-engine car that had to accommodate power steering and other accessories, plus the full complement of emission controls. Forced to buy an engine and manual transaxle, Chrysler obviously had to work within narrow limits in power-train compartment layout. The car may not win a superserviceability award, but it rates a lot better than honorable mention. **MI**

GET OFF TO A GOOD START.



If you're about to up anchor, here's a good starting point: Pack a Honda EM-500 portable generator. The inconvenience—and possible danger—of dead batteries at sea makes the EM-500 vital cargo. Its 500 (max.) watts of power make it perfect for charging

inboard batteries. And it's a compact 40 lbs., so it fits into the smallest storage spaces.

To find the Honda Generator dealer nearest you, just look in the Yellow Pages, or call toll-free 800-228-2056, ext 640. In Nebraska, 402-571-4900, ext 640.

IT'S A HONDA

© 1981 American Honda Motor Co., Inc. For optimum safety and performance, we recommend that you read the owner's manual before operating your Honda Power Product.

INCREDIBLE!



BLECHE-WITE

World's largest selling whitewall cleaner.



We're ready to help...

Ready to tackle some of those repair or redecorating projects around the house? Our friendly experts at Sentry Hardware are ready and willing to offer tips to make every job easier. And we've got the quality products you need...at special values.

When you're ready to do-it-yourself.

HUDSON®
BUGWISER®
Sprayer (6220 SE)
— only **\$26.88**



WERNER®
20' Aluminum Extension
Ladder (D1120-2X) —
only **\$67.88**



shop-vac®
Wet/Dry Vacuum
(700-02-1) — only
\$53.88

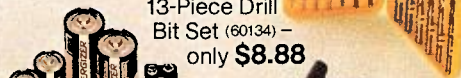


Weller®
8-Piece Soldering
Gun Kit (8200PKH) —
only **\$13.88**



NELSON®
Dial 5 or Oscillating Sprinkler —
your choice (2150SP, 1010) —
only **\$4.77**

Hanson®
13-Piece Drill
Bit Set (60134) —
only **\$8.88**



ENERGIZERS® from
Eveready — your choice,
9 volt, and C or D
Twin Packs (522 BP,
E93BP-2, E95BP-2) — only
\$1.16 per pack



Bostik® POP®
Rivetool Kit (K110) —
only **\$6.88**



STANLEY®
POWERLOCK® Tape
(PL425V) — only **\$7.99**



Check the Yellow Pages under Hardware for the SENTRY store nearest you.

Sentry Hardware Corporation, Cleveland, Ohio 44113.

Merchandise shown in this advertisement is available from participating dealers only. Offer expires June 1, 1981. All Sentry dealers own their own stores. They select their merchandise and set their own prices. There may be variations in products, available quantities and prices in individual stores.



K-CAR SERVICE

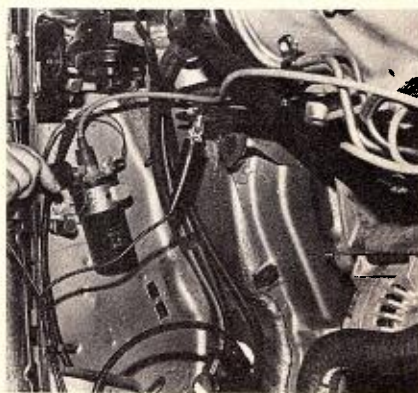
(Continued from page 94)

found was otherwise wasted space. (Honda, Mazda and Ford Escort/Lynx use this space for the distributor.) In this location, the air pump is wide open and there's a convenient 1/2-inch-square hole in the bracket to accommodate a ratchet for the belt-tension adjustment. If you have to change a belt, however, you'll have to remove the pump; even with the bolts at maximum looseness, the belt just won't clear the pump.

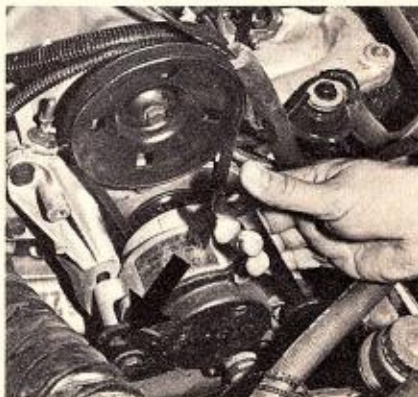
There are two air-pump system hoses, a short one to the air control valve (easy to change) and a long one that snakes through the rear of the power-train compartment (not so easy).

The final V-belt-driven accessory—the power-steering pump—is on the firewall side of the engine. You loosen one bolt from underneath and one from the top, then put a ratchet in a 1/2-inch square in the bracket for tension adjustment.

The timing belt commonly used on an overhead-cam engine also is an important belt. If you have hard starting or poor performance, you should check to see if the belt has jumped a notch. Chrysler has made



Chrysler's K-Car is about the best of the breed for service, as exemplified by the simplicity of test-meter connections.



To tension belt, loosen air pump's bolts, insert a ratchet's square drive in hole (arrow) and move pump.

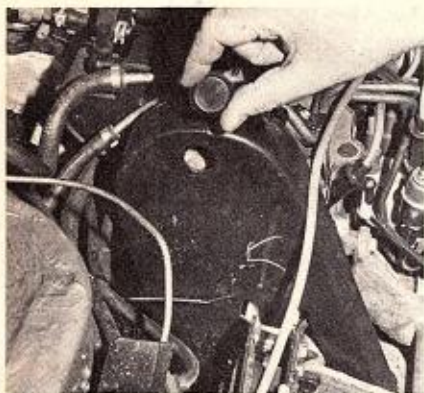
provision for easy checking of the belt.

Crank the engine in short bursts, with the ignition disconnected, until the top dead center (zero) mark is lined up with the mark on the flywheel. If you get close and want to avoid overshooting with the next cranking burst, finish turning the engine by hand, either with a wrench on the crankshaft pulley bolt or by grasping a V-belt, applying tension and a turning motion.

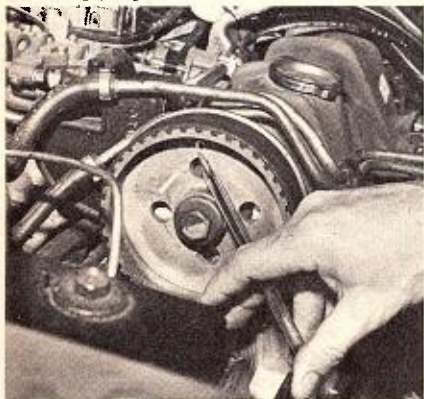
When the marks are aligned, pry out the little plug in the top of the timing belt's plastic cover. Look in the opening (a flashlight may be necessary); the tiny hole (above one of the large holes in the cam sprocket) should be at 12 o'clock, in alignment with a small rubber dowel projecting through the top of the valve cover. If you look carefully, you should be able to see the rubber dowel through the tiny hole.

If the hole and dowel don't line up, the belt apparently has stretched and jumped timing. It takes a special tool to properly tension a new belt, so have the belt replaced by the dealer.

The typical get-under jobs all are easy on the K-Car, except for removing the starter.



You can check to see if camshaft's timing belt has stretched and jumped timing by removing plug in belt's cover.



Pen points to small hole in camshaft's gear that you would see through inspection hole in cam timing belt's cover.

LIGHT UP YOUR LIFE.



The Honda EM-500 portable generator can light up your campsite without weighing you down. It gives you up to 500 (max.) watts of power in a lightweight 40 lb. package. And it's as compact as a small, portable T.V. The EM-500 starts

easily, runs quietly and needs no fuel pre-mixing.

To find the Honda Generator dealer nearest you, just look in the Yellow Pages, or call toll-free 800-228-2056, ext 640. In Nebraska, 402-571-4900, ext 640.

IT'S A HONDA

© 1981 American Honda Motor Co., Inc. For optimum safety and performance, we recommend that you read the owner's manual before operating your Honda Power Product.

POP[®] RIVETOOL BRAND

FOR COMPLICATED FASTENING JOBS... RIVETS ARE FASTER, SIMPLER THAN NUTS, BOLTS, SCREWS.

No home should be without the Pop Brand Rivetool. Faster fastening of metal, leather, canvas, vinyl. Easier fastening because it fastens from one side. Surer fastening—rivets can't shake loose like nuts, bolts, screws. Great for hobbyists, too.

Bostik[®]
CONSUMER DIVISION
Reading, PA 19605 **EMHART**



MUST LIQUIDATE AT BELOW DEALER COST! Gasoline Operated, Emergency POWER GENERATOR

FACTORY NEW! FACTORY PERFECT!

3750 watts! Briggs & Stratton engine! Dual power for 120V and 240V. Made in the U.S.A. Manufacturer's 1 year warranty.

- For home use in emergencies!
- For farm use in operating equipment!
- For commercial use at building sites!
- For vacation use at cabin or camp!

IDEAL FOR EMERGENCY USE! A serious storm could knock out electrical power for hours... or for days! Food could spoil in your refrigerator. Water pipes could freeze and burst in winter if the electric motor in your furnace stopped. (And think of your family shivering in their sleep on a cold winter night without heat!) Your basement could flood without electricity to keep storm waters pumped out. A well could stop pumping water vitally needed for cooking or bathroom facilities. The losses could run into many hundreds, or thousands of dollars!

DEPENDABLE STANDBY POWER SOURCE!

You never have to worry about being without electrical power! Not when you have this portable generator standing by. With 6 outlets to plug in to (120V & 240V), you can run electric lights, or power tools, a sump pump, well pump, or furnace motor. Plug in your small kitchen appliances, a refrigerator, a freezer. Of course, you can't run everything at once (remember the 3750 watt total). But you can run enough things to keep vital functions operating as needed.

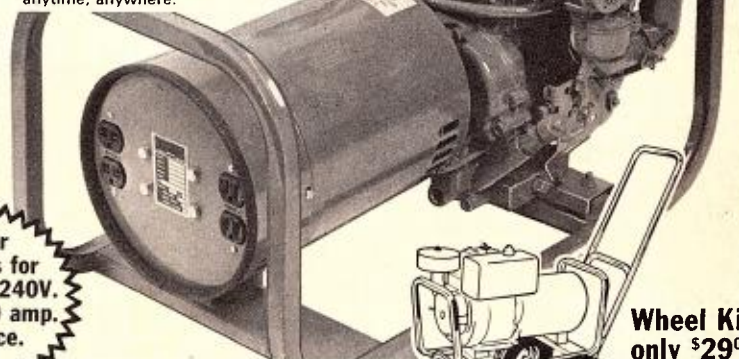
- 4-cycle, single cylinder, Briggs & Stratton engine.
- Air cooled. Recoil start. Manual choke.
- Produces 8 hp. at 3600 rpm.
- Two-pole, revolving field type.
- Solid-state field excitation.
- Chrome-plated piston and aluminum alloy cylinder help dissipate heat for cooler performance.
- 4-quart capacity gasoline tank.
- Four plug-ins: Two for 120V; two for 240V.
- 15 to 30 amp. service for all your household needs.
- Heavy steel base construction for rugged durability.
- Neoprene vibration isolators.
- Metal surfaces red oxide primed to guard against rust.
- All miscellaneous hardware is zinc plated.

Engine ... Briggs & Stratton
Horsepower 8
Watts 3750AC
Volts 120V/240
Amps 15.6/31.2
Phase Single

Frequency 60 Hz.
Outlets Four 120V
Two 240V
Size 17½" W x 28" L x 17" H
Ship wt. ... Approx. 150 lbs.



IN THE FIELD! A reliable source of portable power anytime, anywhere.



Full 3750 watt output from any one outlet!

Four outlets for 120V & 240V. 15 to 30 amp. service.



FOR HOME! Keep sump pump, well pump, appliances operating in case of any power outage.



ON THE FARM! If power fails, use this generator to plug in a variety of necessary equipment.



FOR CABIN or CAMP! In the wilderness, you can enjoy comforts of electricity with this generator.



FOR WINTER STORMS! No freezeups or burst water pipes when you have this generator on hand.

Wheel Kit only \$29⁰⁰

For easy-rolling portability. Big 10" dia. wheels. Sturdy, rugged!

We strongly urge you to compare all the features of this generator with any comparable model. Then compare prices! You will see what a tremendous bargain this is!

**Compare at over
\$1,000.00**

OUT THEY GO AT ONLY:

\$488



Credit card customers can phone orders:



Toll-Free: 800-328-5082

If busy signal, or after business hours, or if in Minnesota, call **800-228-2606** 24 hours a day, 7 days a week.

C.O.M.B. Co.

ONE OF THE NATION'S LARGEST AUTHORIZED MAIL ORDER LIQUIDATORS OF CONSUMER PRODUCTS
3258 MINNEHAHA / MINNEAPOLIS, MN 55406

C.O.M.B. Co. / Authorized Liquidators Dept. B-486-1180
3258 Minnehaha Avenue S., Minneapolis, Minn. 55406

Send _____ 3750 Watt Generator(s) Item No. 1180 at the liquidation price of only \$488.00 each. I will pay shipping charge to driver upon delivery. (Allow 4-5 weeks for delivery. Add an extra 2 weeks if paid by check.) Sorry, no C.O.D. orders.

☐ Send _____ No. 1185 Wheel Kit(s) at \$29.00 each. (Shipped SEPARATE from generator.)

☐ My check or money order is enclosed.

Charge to: ☐ Mastercharge ☐ VISA ☐ American Express

Account No. _____ Expires _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____ Phone _____

Rural Route Customer: If truck carriers do not normally deliver to your home, include a note with this order, stating address of nearest store, friend, truck terminal where we can ship.

Minnesota residents add 4% state sales tax.

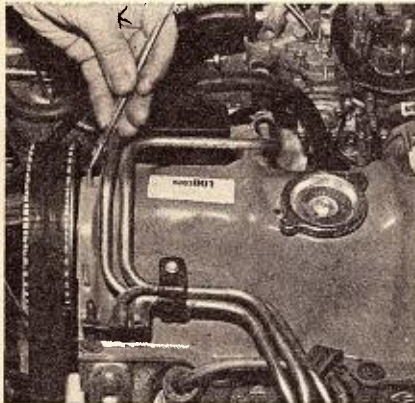
To remove the starter, begin by finding the top bolt, by feel. Once you find it, you'll know how to get it out without real difficulty. Then get underneath, remove the bottom bolt, a shield and a bracket and pull the starter toward the passenger side of the car to get it out.

The exhaust system is open all the way and it has extremely easy rubber doughnut hangers. The rubber pieces are a push-fit on rod extensions from the hangers. You can just pry them off.

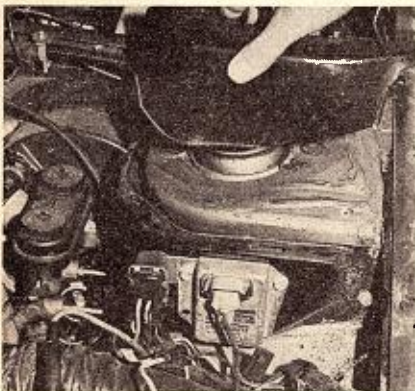
The oil pan is another wide-open item. All bolts are easily accessible and, if necessary, the pan can be dropped straight down.

Some things on the K-Car are out of sight (literally), but you should know where they are just in case. The voltage regulator, starter relay and (on A/C models) fan and A/C relays are attached to a panel on the driver's side strut tower, neatly hidden by a plastic cover.

Chrysler's serviceability engineers didn't win all the battles on the K-Car but, hey, for a car with all the amenities, it's a good service package. When it comes to wrench-twirling, this is the car the others have to beat. **JCI**



Pen points to rubber dowel projecting from valve cover. If belt hasn't jumped, you'll see dowel through hole.



K-Car's voltage regulator and starter relay are mounted on strut tower, under a large, plastic protective cover.

ESCORT/LYNX

(Continued from page 90)

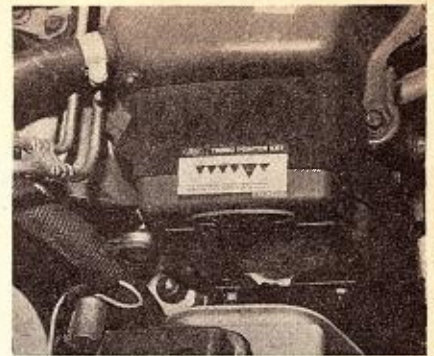
The radiator hoses also pose no special problems, but the heater hoses may. The hoses' connections to the heater core at the firewall are adequately open, but the hoses snake down to the bottom of the engine compartment. There they connect to pieces of tubing that go under the car to the front, where the tubing also connects to hoses. The tubing is the lowest part of the car in front, lower even than the exhaust system, so periodically check it for dents that could restrict coolant flow. The coolant circuit also includes the intake manifold; the hoses that connect to it are really tough. Get to them from underneath and have lots of patience.

The heater core of the Escort/Lynx is one of the easiest to service in the industry. Without A/C, lower the glove box and you have access to a duct housing cover held by four 8mm screws. Take off the cover and there's the core. On cars with A/C, you first must remove a cooling register duct held by a couple of screws and a glove box reinforcement rail, but it's not much harder. On the other side of the firewall, in the engine compartment, loosen the heater hose clamps and push off the hoses.

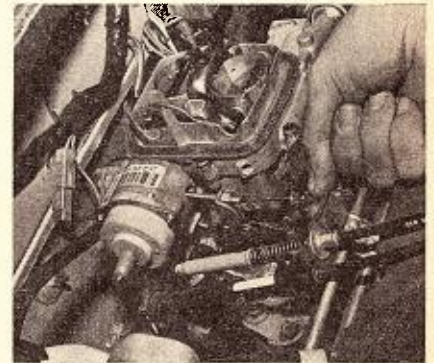
The water pump probably is the worst job in the cooling-system area. It's recessed into the pulley end of the engine. It's not driven by a V-belt but rather by the cogged camshaft belt. To get to it, you must begin by removing the plastic belt cover.

The cover is held by two easily reached 10mm nuts at the top center and two 8mm screws—one easy to reach at the front side, a second on the back side that is a bear (and is best done with a helper). Get underneath and put a socket with a short (1-inch) extension on the screw head, which you can reach up to touch by hand. Have your helper position the ratchet from the top (where there's room for the handle) and push the ratchet onto the extension from underneath. Have the helper operate the ratchet from the top to loosen the screw.

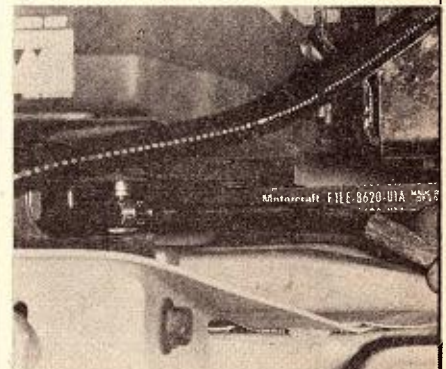
Once you have the nuts and screws out, lift off the belt cover and you can inspect the belt. If it's frayed or if there are cracks in it, install a new one. You also should know that Ford recommends belt replacement every 60,000 miles. This job requires special tools (one of the very few that does on this car) and a multistep procedure giv-



Nice service touch is the decal on top of the engine that helps you locate the timing marks down on the front pulley.



To adjust idle speed on the Escort, loosen a locknut and turn the screw as needed. Note sealed choke adjustment.



One tough-to-reach bolt holds the timing belt's plastic cover. It can be gotten to with a flex-head ratchet.



The Escort employs easy-to-remove rubber exhaust hangers, like many imports, to facilitate exhaust-system service.

\$19,300 NO DOWN PAYMENT BELOW MARKET FINANCING.



The Trenton

If you thought you couldn't afford a home of your own, think again. You still can! Over 15,000 families just like you have built Miles Homes using our step-by-step instructions. 50 exciting do-it-yourself models plus a full selection of optional packages—like heating, plumbing and electrical packages—are available to give you the home you want at a price you can afford.

NO DOWN PAYMENT—50 MODELS.
Sample Credit Terms: Cash price \$24,000. Annual percentage rate 11%.
Deferred payment price \$29,402 payable in 22 monthly payments of \$241 and one final payment of \$24,100. Terms are not for model shown and may vary state to state.

Under revolving charge plans available in some states, a finance charge of 11% annual percentage rate is applied to a balance equal to the amount owed each day of the billing period divided by the number of days in that billing period. Cash price does not include plumbing, heating, and electrical packages also available from Miles.

Find your home in our FREE full-color catalog.

- 80 pages filled with photos, illustrations and plans.
- 50 exciting models.

See our ranch homes, split-level homes, split-foyer homes, 2-story homes and 1½-story homes. Plus the complete Miles story including details of our unique Shelter Finance Plan, pre-cut quality, available options and more—everything you need to pick out your dream home. Send for yours today.

Mail to: Miles Homes 4700 Nathan Lane, P.O. Box 41310, Minneapolis, MN 55442

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

PHONE _____



**You're Miles ahead
with no down payment.**

MM15

en in the Escort's shop manual.

If you loosen the belt, as you must to take out the water pump, you must replace it—don't reuse the belt under any conditions. Because the water-pump job is not something to look forward to, Ford has made the pump a super-heavy-duty part with deluxe bearings and seals.

Just because a job doesn't have to be done frequently, doesn't mean it should be difficult. Most of, but not all, the once-in-a-while jobs are reasonable on Escort/Lynx.

Because the air pump is at the engine's top (though at the rear), both it and its belt are easy. The rest of the air system isn't, however. The hoses really snake around and, like the heater hoses, are hard to change. The air-pump control valve assembly is buried on the fly-wheel end of the compartment.

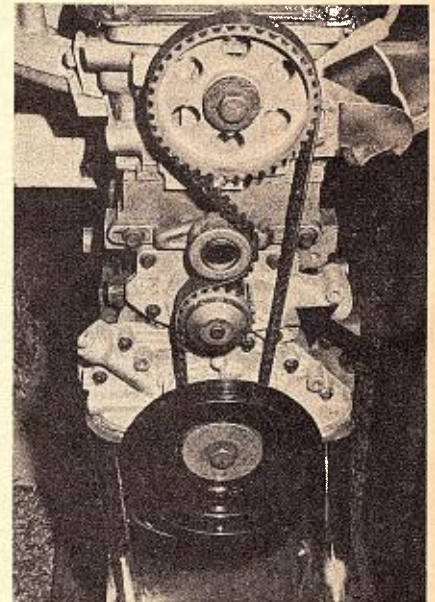
The exhaust system is held by rubber doughnuts, all nicely accessible. If you have to disconnect, just push them off their retaining rods.

The fuel pump is on the top of the engine at the flywheel end, next to

the carburetor, and replacing it should be easy. The nuts that hold the carburetor are a bit buried but, with a ⅜-inch-drive ratchet, all reachable.

The starter comes out from underneath. You have to disconnect and lower the exhaust system (including a disconnect at the manifold), but there are a lot worse.

Those of you who get into heavier service should know that the aluminum head on the Escort/Lynx is held by special head bolts that should not be loosened or removed unless necessary for a specific job. Once loosened, they are rendered unusable and must be replaced. Because they're special, you'll have to get them from the dealer. You still can check their tightness periodically with a torque wrench, however, and make minor torque adjustments, if necessary. **MI**



To replace the water pump (arrow), you've got to remove the timing belt, which, unfortunately, cannot be reused.



The emissions air pump on the Escort has a remote-mount air filter mounted near the pulley end of the engine.

RABBIT SERVICE

(Continued from page 96)

Ignore the stop screw on the throttle linkage at the intake-air distributor. Instead, locate a hex-head screw on the back of the air distributor. This screw controls an air bypass. Turning the screw out increases idle speed; turning it in reduces it. This is just the opposite of the idle-speed screw that bears against throttle linkage.

Rabbit cooling-system service is generally easy. The fan can be disconnected at the motor and you can remove the fan-motor assembly without difficulty. Once it's out, remove the two nuts that hold the radiator, disconnect hoses and lines and the fan-temperature sensor and lift the radiator up and out. There's not a lot of hand room around the nut on the driver's side, so you'll probably have to use a long extension on the socket. When you reinstall, use grease to hold the nut in the socket or remove the battery to get some work space.

The water pump is at the front side, near the bottom of the engine, and it's easy to service from underneath. The thermostat is on the bottom of the water pump so you also have to get at it from underneath. The location isn't great but at least the job isn't hard. The water pump is driven by the same belt that spins the alternator, which is on the top, front side and wide open. Belt adjustment is in its bracket.

On Rabbits with air conditioning, the alternator goes down a bit to make room for the compressor, but you still can get to the alternator belt adjustment (though you must unbolt and lift the compressor if you want to remove the alternator). The A/C belt also is no problem, though some parts of the system—except the compressor—are not so accessible.

The heater-hose routings are fair, but a heavy rubber shield covers the area where the hoses clamp to the heater-core nipples. This cover must be pried away to gain access to the clamps. The heater core is in the middle of the duct housing. You've got to drop the duct housing from under the dashboard and take it apart to get the heater core out. It's a job for a pro.

The Rabbit gasoline engine is one of the few overhead cam engines that is not destroyed if the cogged timing belt snaps (the diesel version is). However, the belt still should be checked routinely, because if the belt stretches excessively and jumps

Now You Can **SECURE** Your Future and **UNLOCK** Big Opportunities!

Be Your Own Boss ... IN YOUR OWN BUSINESS!

Hundreds we've trained have succeeded in this fascinating and highly profitable profession...
...YOU Can Do It, Too!



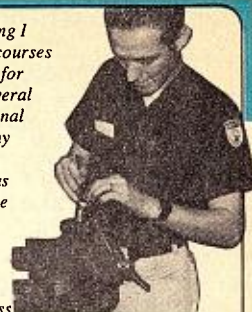
"No more hard, nasty work for me. Now I have my own business and with hardly any effort I average around \$50 a day. Thanks for my new start in life."
Sam Walker Prichard, Alabama



"I opened my own business, spare time, seven months after I enrolled and made a profit of \$329 for the first week."
B. A. Deberry Littleton, Colorado

"Before enrolling I checked other courses and also asked for advice from several of the professional locksmiths in my area. They all said Belsaw was tops and has the most versatile Key Machine. 'I always wanted to have my own business and now I do, thanks to Belsaw.'"

David Fairbrother—Dave's Locksmith Service
Milwaukee, Wisconsin 53209



Work Part Time, Full Time — Right at Home.

Be a LOCKSMITH!

Get into this booming high-profit business that's
Easy to learn — Easy to do — Easy on You!

Never before have money-making opportunities been so great for qualified Locksmiths. Now lucrative regular lock and key business has multiplied a thousandfold as millions seek more protection against zooming crime. Yet there's only one Locksmith for every 17,000 people!

Make Up to \$12.50 an Hour—even while learning!
Train FAST at Home!

You're "in business" ready to earn up to \$12.50 an hour a few days after you begin Belsaw's shortcut training. Take advantage of today's unprecedented opportunities in Locksmithing for year-round EXTRA INCOME in spare-time—or fulltime in a high-profit business of your own. Hundreds we've trained have done it. So can YOU! All tools plus professional Key Machine given you with course. These plus practice materials and equipment, plus simple, illustrated lessons, plus expert supervision, plus business-building guidance will enable you to KEEP THE MONEY COMING IN! Ideal for retirement—good jobs too.

SEND FOR EXCITING FACTS—No Obligation

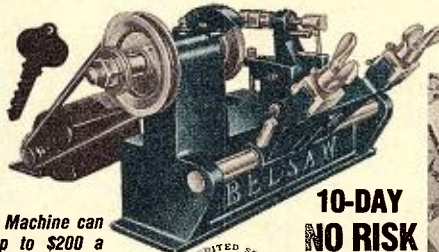
Discover what's in Locksmithing for you—how Belsaw's Master-Locksmith-approved training can give you the skill you can depend on to EARN MORE—ENJOY LIFE MORE.

**PRO KEY
MACHINE
YOURS
TO
KEEP!**

This Pro Key Machine can alone add up to \$200 a month to your income... and it won't cost you a penny extra with your training.

Find out all about it!

Just fill in and mail coupon below (or send postcard) to receive full information and details by return mail. **DO IT TODAY!**



**10-DAY
NO RISK
TRIAL!**

SEND FOR
FACTS TODAY!

**RUSH
COUPON**



BELSAW INSTITUTE
122B Field Bldg., Kansas City, Mo. 64111

There is **NO OBLIGATION** and **NO SALESMAN** Will Call—ever!

**RUSH COUPON TODAY
FOR THIS FACT-FILLED**

**FREE
BOOKLET!**

Tells how you quickly train to be your own boss in a profitable Sparetime or Fulltime business of your own PLUS complete details on our **10-Day NO RISK Trial Offer!**



Send for your
copy today!

BELSAW INSTITUTE, 122B FIELD BUILDING
KANSAS CITY, MISSOURI 64111

☐ YES, please send me the FREE booklet that gives full details about starting my own business in Locksmithing. I understand there is no obligation and that no salesman will call.

Name _____

Address _____

City _____

State _____ Zip _____



teeth on the camshaft or crankshaft timing gears (sprockets), the engine may not start. And, if it does start, it will run very poorly.

Remove the nuts and screws that hold the belt's plastic cover (two of these are the nuts that hold the valve cover at the front). You'll need a metric Allen wrench to take out the screw that goes through the face of the belt cover. Here you're working in tight quarters, so if you follow my recommendation and get socket bits, put the bit on a very short extension and turn the bit with locking pliers on the extension or the correct-size open end wrench on the Allen shank.

The belt is adequately tensioned if, with thumb and forefinger, you can just turn it 90°. If it turns very easily or if there is obvious looseness, make a tension adjustment: Loosen the locknut and turn the adjuster clockwise to increase tension. Lightly tighten the locknut and make the 90° twist check again. If tension is right, securely tighten the locknut. Changing a frayed belt, however, is a job that requires special tools and should be left to a pro.

Valve adjustment is another job that takes special tools. The adjustment is with shims that fit into a recess in the valve lifter (actually not a lifter on this overhead cam engine, but a *cam follower*). To make adjustments, you need a special tool that forces down the cam follower so it is well clear of the cam lobe. Then you can reach in with a magnet or special pliers to extract the old shim and install a thicker or thinner one, as needed, to bring clearance to within specifications.

To do the job you need an assortment of shims, something only the dealer can justify keeping in stock. You can buy the special tool (it isn't expensive) from an independent foreign-car parts store if you wish, but you're still stuck with going to the dealer for the shims. Recommendation: Leave this job to the dealer.

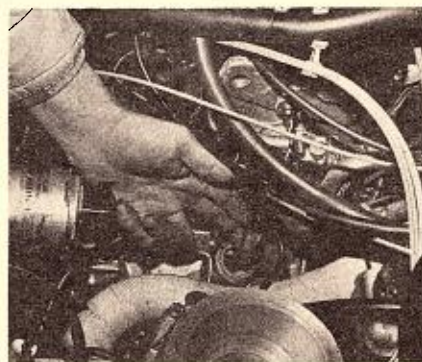
Two other jobs you might also tackle are no problem. The oil filter is on the front side of the engine and so accessible you can change it either from the top of the engine compartment or from the bottom. The oil pan is wide open at the bottom and you can drop it for a gasket change or other service without difficulty.

The location of the starter depends on the transmission. If it's a manual, it's on the front (radiator) side of the engine. Although it's

held by metric Allen bolts, it's not a tough job.

The starter on automatics is on the rear (firewall) side of the engine. There's a clamp and cover that have to be aligned during installation. The job is not as tough as on the old Beetles, but the manual transmission model certainly is easier.

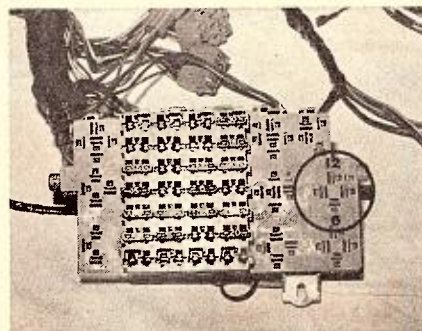
VW undoubtedly could juice up the Rabbit's fuel-economy numbers with a computer and a dozen or so underhood sensors and motors. It could make the steering lighter by offering the power assist. Market pressures may yet force VW in those directions. For the present, however, this oldest model of the modern transverse-engine breed still is state-of-the-art, and a serviceable package, too. **MI**



Plastic plug on manual-transmission models pulls up to expose ignition timing marks on flywheel. Automatics have no plug.



Electronic-ignition control unit is found in the plenum. Pull off water shield, then lift out unit for testing.



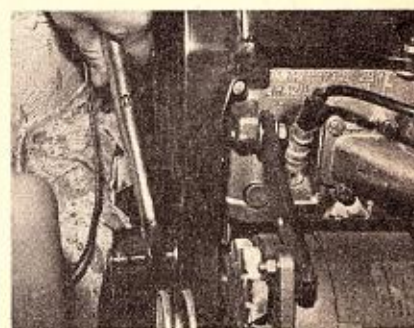
Jumper wire hooked to fuel-pump relay terminals at 12 and 6 o'clock hot-wire bypass relay for fuel-injection test.



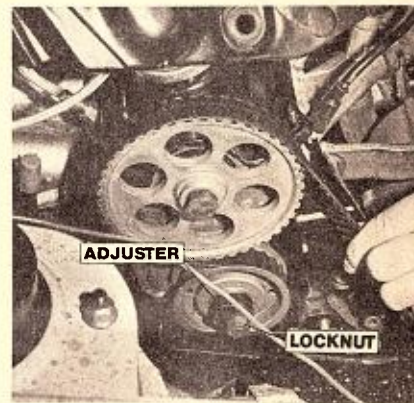
Injector should emit a smooth spray of fuel when sensor flap (movable plate in fuel distributor) is pulled up.



Engine idle speed is controlled by a hex-head screw, which is found at the back of the intake-air distributor.



Allen socket bit and short extension turned by locking pliers can remove hard-to-reach screw on timing-belt cover.



Loose timing belt can be tightened by slackening locknut and turning adjuster clockwise. Then securely tighten locknut.

HOME APPLIANCES*(Continued from page 59)*

door air is often 10 times more polluted than outdoor air, this may be a critical health factor.

Refrigerators and freezers have better insulation now that energy consciousness has pervaded the industry. These new appliances are 40 percent more efficient than they were in 1972. Amana is test marketing a new model refrigerator-freezer that claims a 55 percent saving in energy costs. The Amana design was developed by Arthur D. Little and involves an improved defrost system. The refrigerator only defrosts once every four days, as opposed to conventional energy saver models which defrost twice daily. Conventional frost-free refrigerator-freezers cost four to five times more to operate than manual defrost.

DRYERS

New gas dryers have automatic pilots, which is a 20 percent energy saving feature. G.E., Maytag, Sears and Whirlpool have introduced moisture sensing dryness control, which saves energy by shutting the dryer off when clothes are dry.

Another interesting development is the marketing of kits to divert heated air from the dryer into the home as an auxiliary heat source in winter. These should probably not be used with gas dryers.

CLOTHES WASHERS

New washers will be smaller and offer fewer water temperature options. The reason for this is manufacturers have had to come up with appliances that use less hot water in order to survive the DOE energy ratings. Unfortunately, large capacity washers can reduce energy consumption by 12 percent for those who use them to capacity.

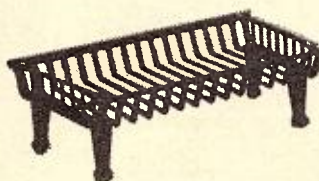
Front loading washers are substantially better at conserving energy than top loaders, because they use one-third less water. They also use one-third less detergent, and it is this factor that has caused performance problems, because users tend to use too much detergent.

Overall appliance prices are on the rise. At present, because appliance prices have only gone up by half the inflation rate during the 70's, they are still a relative bargain. But costs of design changes and materials have hit the companies hard and profit margins are so tight that buyers will feel squeezed. **MI**

LIQUIDATORS OF INVENTORY**NOW YOU CAN BUY DIRECT FROM A LIQUIDATOR!**

We buy large inventories from companies throughout the U.S. Merchandise becomes available through overruns, discontinues, last years models, close-outs, bankruptcies, bank foreclosures, etc. We offer this vast variety of merchandise for sale to you through our monthly catalog "Liquidators of Inventory". All merchandise listed in our publication is in our warehouses. This merchandise changes each month as orders are filled and new inventories brought in. The monthly catalog you will receive will include all new merchandise recently acquired. Everything sold is new and unused. Many items can be purchased from us at below manufacturing cost.

Pictured below is a sampling of just a few of the items appearing in a recent publication.



20" Cast Iron Fireplace Grate
Sug. List \$19.95 ea.
Our Price \$9.99 ea.
10 Or More \$7.99 ea.

All Cast Iron Heater-Stove

Sug. List \$149.95 ea.
Our Price \$59.95 ea.
10 Or More \$49.95 ea.



Goodyear Wheel
11 x 4.00-5 Two ply
3/4" I.D. Bearings.
Sug. List \$26.50 ea.
Our Price \$13.95 ea.
10 Or More \$11.95 ea.



Galvanized Steel 5 Lb. Folding Boat Anchor
Sug. List \$12.95 ea.
Our Price \$5.99 ea.
10 Or More \$4.99 ea.

The Green Machine
Nylon String Weed and Grass Trimmer - Model 1200
Sug. List \$59.95 ea.
Our Price \$24.95 ea.
10 Or More \$22.95 ea.



50 Ft. Outdoor Extension Cord
16 Gauge-2 Wire
Sug. List \$8.79 ea.
Our Price \$4.49 ea.
12 Or More \$3.99 ea.



Mini Bike Clutch
Sug. List \$22.95 ea.
Our Price \$10.95 ea.
10 Or More \$8.95 ea.



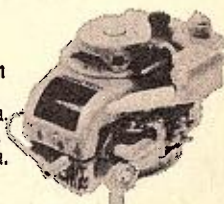
Tractor or Riding Mower Seat
Sug. List \$28.95 ea.
Our Price \$14.95 ea.
10 Or More \$12.95 ea.



Lawn Mower Blade
Sug. List \$5.95 ea.
Our Price \$1.49 ea.
10 Or More \$1.00 ea.



Tecumseh/Craftsman 3 1/2 HP. Engine
Sug. List \$133.50 ea.
Our Price \$59.95 ea.
6 Or More \$54.95 ea.



This catalog is an asset to anyone interested in purchasing merchandise such as lawn and garden products, motorcycle and mini-bike parts, tools, agricultural goods, electrical products, household items and all types of hardware and industrial stocks.

Due to the variety of products we sell and especially because of the prices we're so sure that you will order merchandise from our catalog that if after receiving it you are dissatisfied for any reason your subscription fee will be refunded for the unused portion.

We are a fully authorized and licensed liquidator and mail order corporation and invite you to check with our local Chamber of Commerce.

Fill out the handy order blank below and send for the "Liquidators of Inventory" catalog today.

Bailey Sales Corp., P.O. Box 127, Corunna, MI. 48817

Bailey Sales Corporation

**BOX 127
CORUNNA, MI. 48817**

- ☐ Enclosed is my check or money order for \$14.50 for one year's subscription.
☐ Charge to my credit card.
☐ Outside U.S. \$29.00 in U.S. funds.



Name **MI**

Address

City State Zip

☐ Master Charge ☐ VISA

Expires

Account Number

Signature

CORNER CUPBOARD

(Continued from page 60)

When the top is in position and molding has been put on the back stop, you can secure the unit to the wall. Room corners have double studs so anchor the top to the wall.

Plexiglas was used both for safety and because the top door, being

large, would require a too-heavy piece of glass. A 4x8 sheet of 1/8-in.-thick material was used for the top door and shelves. Mark the protective paper on the Plexiglas to the size you want and with a straight-edge as a guide, scribe the surface with the cutter. A hint: Cover the piece with the straightedge so that if you go out of the groove, you won't

ruin the prime piece. Break the plastic with a dowel under the cut line and press down until it snaps.

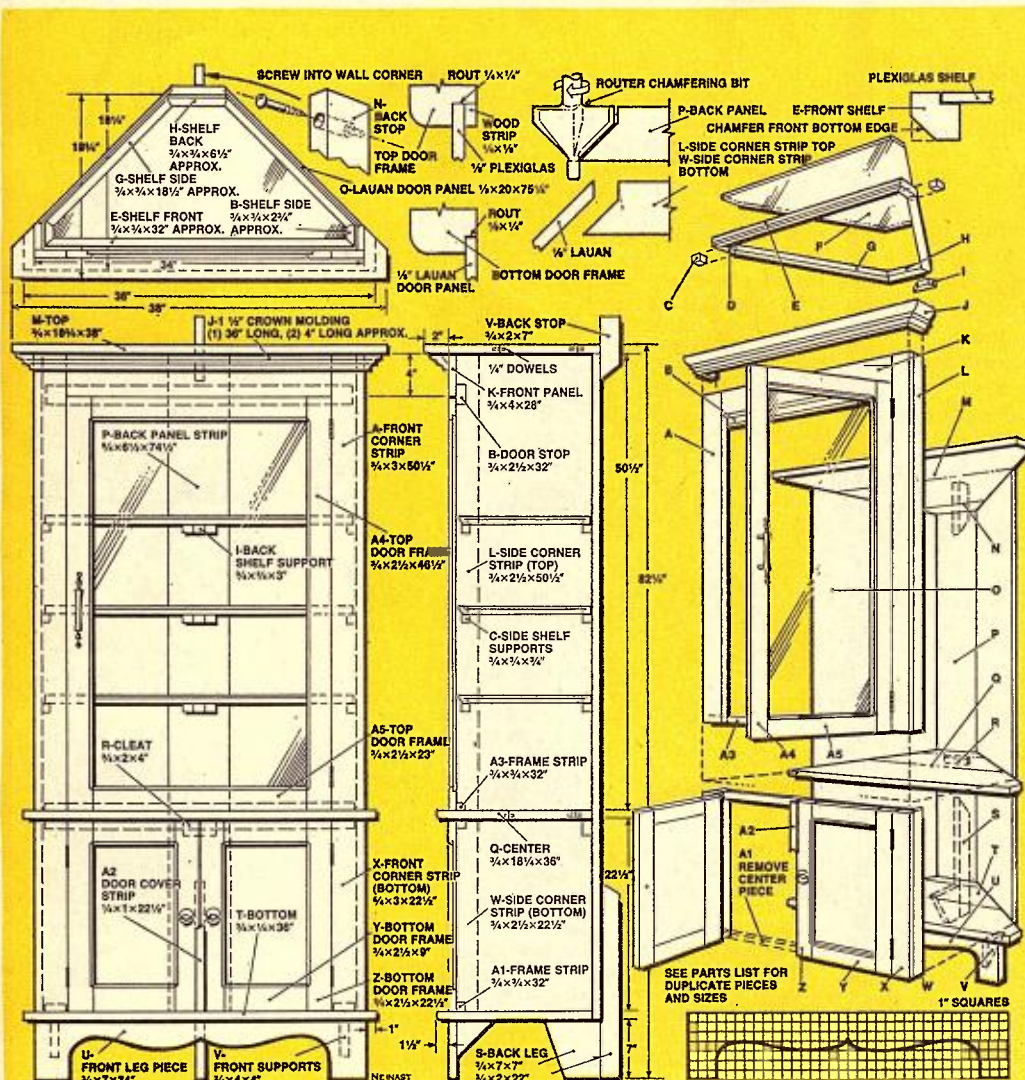
Finishing is important as oak has an open grain. To fill this grain, use a wood filler. Sand thoroughly and apply with one coat of varnish. Sand the first coat of varnish with a fine-grit paper. A second coat of varnish is applied, then wax. **MI**

Key to Materials

A-(2) Front corner strip: 3/4x3x50 1/2 in.
B-(1) Door stop: 3/4x2 1/2x32 in.
C-(6) Side shelf support: 3/4x3/4x3/4 in.
D-(6) Shelf side: 3/4x3/4x2 3/4 in. (Approx.)

E-(3) Shelf front: 3/4x3/4x32 in. (Approx.)
F-(1) 1/8x4x8 Plexiglas
G-(6) Shelf side: 3/4x3/4x18 1/2 in. (Approx.)
H-(3) Shelf back: 3/4x3/4x6 1/2 in. (Approx.)
I-(3) Back shelf support: 3/4x3/4x3 in.
J-(3) 1 1/2-in. crown molding: (2) 4 in. (1)

36 1/2 in. (Approx.)
K-(1) Front panel: 3/4x4x28 in.
L-(2) Side corner strip (top): 3/4x2 1/2x50 1/2 in.
M-(1) Top: 3/4x18 3/4x38 in.
N-(1) Back stop: 3/4x2x7 in.



O-(2) 1/8x20x75 1/4 in. lauan
P-(1) Back panel strip: 3/4x6 1/2x74 1/2 in.
Q-(1) Center: 3/4x18 1/4x36 in.
R-(1) Cleat: 3/4x2x4 in.
S-(1) Back leg: 3/4x7x7 in.; 3/4x2x22 in.
T-(1) Bottom: 3/4x18 1/4x36 in.
U-(1) Front leg piece: 3/4x7x34 in.
V-(2) Front supports: 3/4x4x4 in.
W-(2) Side corner-strip (bottom): 3/4x2 1/2x22 1/2 in.
X-(2) Front corner-strip (bottom): 3/4x3x22 1/2 in.
Y-(4) Bottom door frame: 3/4x2 1/2x9 in.
Z-(4) Bottom door frame: 3/4x2 1/2x22 1/2 in.
A1-(2) Frame strip: 3/4x3/4x32 in.
A2-(1) Door cover strip: 1/4x1x22 1/2 in.
A3-(1) Frame strip: 3/4x3/4x32 in.
A4-(2) Top door frame: 3/4x2 1/2x46 1/2 in.
A5-(2) Top door frame: 3/4x2 1/2x23 in.
(6) 3-in. Hinges
(3) Door handles

REJUVENATING YOUR LAWN

(Continued from page 63)

spread can produce too many seedlings competing for nutrients, moisture and light. Top-quality seed brands include specific directions on how thick to spread the seed. Using

a precision spreader is the best answer for areas larger than 10 sq. ft.

Step 4: Feed the seedlings. Young grass plants need different nutrition than established ones. Use a fertilizer designed especially for new seedlings. Label information includes a

high middle number, indicating the phosphorus content which is primary to the young seedlings/plants.

Proper nutrients will help the new grass to spring up faster and sturdier. The best and most convenient way to assure adequate feeding is to fertilize at seeding time.

Step 5: Water lightly and often. Depending on your area and type of soil, you may need to water two or three times a day. Agronomists at Scotts tell us that probably 90 percent of seeding failures are due to lack of moisture after germination. For at least the first month, the upper inch of soil should not dry out.

Step 6: The follow-through. Traffic should be kept off the new seed bed until it is established. However, the new grass should be mowed regularly as soon as it is up and clippings and leaves should be removed. The lawn should be fertilized again four to six weeks after planting, this time with a regular, long-acting, high-nitrogen fertilizer.

If you are not seeding this spring, you should fertilize the lawn early to build up the grass and its appearance. Every lawn needs feeding after winter dormancy, since soil does not naturally contain enough nutrients to support a luxuriant green turf. If your lawn is in reasonably good condition. Choose a long-acting type of fertilizer—one that releases its nutrients over a six- to eight-week period, and again, one with a high nitrogen content.

One of the rewards of having healthy, well-fed grass is that it does a first-rate job of holding down the weeds. A thick turf helps keep weed seeds from receiving the sun and space they need to take hold.

In the late spring you'll find yourself coping with weeds, i.e., dandelions and such. If you seeded this spring, wait until you have mowed at least four times after seeding, then apply weed control for dandelions and other broadleaf weeds.

By this time grass should be ready for its second feeding, and you can cope with weeds at the same time by feeding the lawn a slow-release weed control fertilizer.

Before applying weed control or a weed-and-feed product to your lawn, mow it. This keeps the spreader bottom from shaking the weed-control particles off weed leaves.

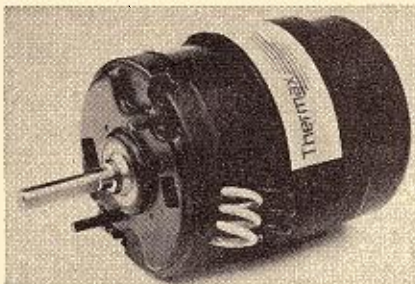
Make sure your lawn is wet before applying weed control; but beware of rain. After application, your lawn must remain dry for at least 24 hours for the control product to work.

Within a few days weeds will begin to wilt noticeably and completely disappear within a few weeks. As the weeds fade the fertilizer does its job and stimulates new grass growth to fill out vacated spots. **MI**

FREE ELECTRICITY!

START GENERATING YOUR OWN POWER FROM RENEWABLE ENERGY SOURCES

BUY THIS GENERATOR — GET FREE PLANS



THE AMAZING TC25G PERMANENT MAGNET LOW-RPM DC GENERATOR

SO SENSITIVE that it acts like a selsyn when connected to a small dc motor! Turn the TC25G generator shaft with your fingers and the motor rotates by the same amount — in either direction!

SO EFFICIENT that it can produce 12 volts at under 400 rpm!

SO POWERFUL that it can deliver over 6 amperes into a short circuit!

How did such an unusual generator get built? Here is the story:

The TC25G began as one of many components, of a unique low-cost wind generator — the TC25 Helius Rotor. It was during the development of this new rotor that our engineers discovered there was no inexpensive, low rpm generator to be found anywhere, that was suitable for small windpower converters — or, for that matter, for water wheels, pedal power, solar engines, fuel powered generators, or any other small energy needs.

It was tempting at the time to turn to "small" automotive alternators — which need several thousand rpm to generate the kind of voltage we wanted. They are large, heavy and also require an efficiency-killing step-up pulley to achieve the necessary rpm to generate power from a small water wheel or windmill.

DESIGNED FOR THE NEW ERA OF RENEWABLE ENERGY SYSTEMS

Meanwhile, the price of oil and other fuels was just starting to skyrocket. Many energy-conscious people had made up their minds not to take these price hikes lying down. More and more people were thinking seriously of switching to free renewable energy sources — solar, wind, water — simply because it had begun to make good economic sense. Needing to produce exactly the right product for the growing boom in home-sized alternate energy products, Thermax engineers started from scratch to design the perfect small generator. It had to be inexpensive, light, and operate efficiently at low rpm (which no other small generator could do).

The result was the TC25G permanent-magnet dc generator — which may be exactly the generator you've been looking for. At the Energy Lifestyle Show, visitors who tried our demonstration generator were so amazed by its sensitivity that some even looked underneath to see if there was a trick to it! Many enthusiasts bought generators on the spot.

PERFECT FOR OWNER-BUILT SYSTEMS

At first, Thermax sales personnel were surprised that so many customers were attracted by the generator alone and didn't want to buy the whole windmill kit. Even without advertising, inquiries kept coming from do-it-yourself energy enthusiasts who wanted to build their own power systems, not Thermax's or anyone else's.

So here you are — the ideal small dc generator, with plans (if you need them) to build several different renewable energy converters. Now you can start generating your own free, natural energy!



1 MILL STREET, BURLINGTON, VERMONT 05401

SPECIFICATIONS: TC25G GENERATOR

Two-pole permanent magnet dc generator. Ten-slot armature wound with 0.4 mm (26 AWG) wire. Internal resistance 7 ohms; heavy-duty long-life brushes. Mounts by two 10-32 studs at shaft end of case.

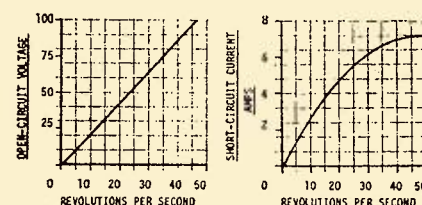
New! Steel flux augmentation ring now supplied with each generator.

Dimensions:

Case length	4-7/8 inch	(124 mm)
Case diameter	3-1/2 inch	(88 mm)
Shaft diameter	5/16 inch	(7.94 mm)
Weight	4 lb.	(1.8 kg)

Electrical Performance

Rated for 12 volts dc, will generate 6, 12, 24 or 32 volts with appropriate voltage regulator.



FREE PLANS AND USER'S GUIDE

Order your TC25G now and receive, free with your generator, a complete applications guide: all you need to know about wiring, voltage regulators, batteries, inverters to step up to 110 volts ac, as well as plans for building one of the following energy producers:



WIND POWER The TC25G is already standard equipment in Helius rotor kits. You can build your own wind generator from plans furnished. (Plan P1)

WATER POWER If water power is available you can build your own small hydroelectric generating station. (Plan P6)

PEDAL POWER Convert an old bicycle to generate power: pedal your television set! (Plan P11)

BEGIN YOUR ENERGY INDEPENDENCE TODAY!

SPECIAL OFFER

YES send me _____ TC25G generators and plans now for only \$69 each (two for \$130), plus \$4 each for shipping and handling in CONTINENTAL USA. Vermont residents, add 3% tax.

☐ My money order or check is enclosed.

My choice of free plans is: (Check one for each generator ordered)

☐ P1 Wind power ☐ P6 Water power
☐ P11 Pedal power

NAME _____

PHONE _____

STREET _____

CITY _____

STATE _____ ZIP _____

THERMAX CORPORATION

1 MILL STREET, DEPT. MI 3

BURLINGTON, VERMONT 05401

INSTANT ORDER DESK

(Credit card customers only)

CALL TOLL-FREE 800-451-3402

(In Vermont call 802-658-1098)

In Canada call 613-678-3322

Satisfaction guaranteed: if you are not completely satisfied with your TC25G generator, return it to Thermax in original condition within ten days of receipt for a prompt refund.

Sekon Int'l. knows that the Swarup sounds too good to be true to the thinking man.

Swarup. Hard to pronounce. Easy to install under the carburetor. Small but mighty static-swirl mixer. It saves gas. Adds power. Increases torque. Reduces vibration. Prolongs engine life. A proven performer. Guaranteed for life against defects. You have to try it to believe it.

Skeptics relax. Sekon Int'l. invites you to be the judge, at no risk to your pocketbook. Order the Swarup today (c.o.d. and freight charges prepaid by Sekon Int'l.). If, in sixty days you are not "sold" on it, return it and get your money back.

To the thinking man, an invitation second to none. Swarup, a device of the decade.

INVITATION TO SKEPTICS...

U.K. Patent 1568243
Canada Patent 1,090,220
Others Pending

- * 10-20% Increased Fuel Economy
- * Power Increased 10-20%
- * Increases Torque Through RPM Range
- * Prevents Overheating
- * Reduces Carbon Deposit
- * Engine Rotation- Smooth and Steady
- * Easy Starting at All Temperatures
- * Less Pollution
- * 60-Day Money Back Guarantee



Application For:

One barrel carb \$38.95
Two barrel carb \$48.95
Four barrel carb \$68.95
Also available for motorcycles, boats, and airplanes.

"SEKON,

Second to None!"



Sekon Int'l. Corp. of America
2210 Wilshire Blvd., Suite 577MI
Santa Monica, CA 90403
(213) 393-9791 Telex 182014

DRILLS & BITS

(Continued from page 52)

pansive bit (wood only), the hole saws and the fly cutter.

You can make holes in wood up to 1½ in. with spade drills and up to an inch with auger bits or twist drills. You also can get larger auger bits, but they are not widely available. Twist drills with ½-in. shanks that fit portable drills don't get larger than 1 in.

Holes in wood larger than 1½ in. can be made with an expansive bit chucked in a brace or with a hole saw in an electric drill. An expansive bit is not exactly an adjustable auger bit, but the relationship is close. It comes in several sizes; by all means get the big one that drills holes up to 3 in. The interchangeable (small and large) blades are calibrated for their diameter ranges but don't put too much trust in the calibration. Always test the bit in scrap after you set it for the needed diameter. And be careful that the dial screw that locks the cutter in position is very tight.

A hole saw is in the form of an inverted cup with saw teeth around

SQUARE-HOLE DRILL



Mortising Bit Set

the rim. It is mounted on a mandrel which is chucked into your drill. A twist-drill pilot starts the hole saw on the right path.

Although a hole saw goes right through ¾-in. wood without pause, I would recommend backing out the saw before you complete the hole so that you can bust out most of the waste with a chisel. Getting that plug out of the saw when it is in one piece can waste a lot of time.

You have to buy a separate hole saw for each size hole. Fortunately, you do not have to buy a separate mandrel for each saw; the mandrel is the expensive part. Some mandrels and saws can be interchanged between brands; check before you buy. Hole saws also come with carbide teeth. Besides lasting longer than those with steel teeth, they can be used in plaster and gypsum board.

A fly cutter, also called a circle cutter, can be used in a drill press for making holes from ⅞ in. to 4 in. in diameter—in thin sheet steel, aluminum, wood and plastic. When used in metal, the work should be

backed up by ¾-in. plywood. The work also must be clamped in order to prevent jumping.

For the cleanest cut, the hole should be cut part way, then the work turned over for completion (except in thin metal). Feed should be dead slow, even slower in metal when you are about to break through.

Square-hole drill. This is a mortising-bit set that's used on a drill press and gives you a hole with four sides.

These sets are used to make rectangular recesses that accept tenons in mortise-and-tenon joints. The work must be done on a drill press. The drilling is done by an end-cutting bit rotating inside a hollow, square chisel. An attachment clamps the chisel to the drill press quill. A hold-down bracket (not shown in the photo, below) is used with the mortising bit to hold the workpiece exactly in place for the cut.

To drill the square hole you have to bear down; the drill cuts a round hole while the chisel squares the hole. Precise vertical alignment is essential for operation. Rectangular

holes are made by drilling a row of overlapped square holes. Be sure the set you buy fits the specifications of your drill press.

You can buy basic drills and bits in hardware stores and in home centers. Specialized drills and bits may have to be mail-ordered. Following are some companies that carry selections of these tools. Write for catalogs.

Brookstone Co., 127 Vose Farm Rd., Peterborough, N.H. 03458.
Constantine, 2065 Eastchester Rd., Bronx, N.Y. 10461. **Craftsman Wood Service Co.**, 1735 W. Cortland Ct., Addison, Ill. 60101. **The Fine Tool Shops, Inc.**, 20-28 Backus Ave., Danbury, Conn. 06810.
Frog Tool Co. Ltd., 700 W. Jackson Blvd., Chicago, Ill. 60606. **Garrett Wade Co.**, 161 Avenue of the Americas, New York, N.Y. 10013. **Leichtung**, 4944 Commerce Pkwy., Cleveland, Ohio 44128. **Sears, Roebuck & Co.** (any catalog store.) **Woodcraft**, 313 Montvale Ave., Woburn, Mass. 01888. **The Woodworkers' Store**, 21801 Industrial Blvd., Rogers, Minn. 55374. **MI**

Your home workshop

3-in-1 Power Tool!

This one power-fed tool—
SAWS to desired Width...
PLANES to desired Thickness...
MOLDS all popular Patterns...
 —all in one fast operation!



can PAY-OFFBIG!

Try The
 Belsaw In Your
 Own Shop On Our
**30-DAY FREE
 TRIAL OFFER**
 Mail Coupon Below
 For Complete
 Details!

Send TODAY
 for this
 fact-filled
**FREE
 BOOKLET!**



Only Complete Workshop Tool Of Its Kind In The World!

From the day it arrives the Belsaw will make and save you money. With shortages and inflation driving lumber prices sky-high, this versatile power tool quickly pays for itself by easily converting low cost rough lumber into high value finished stock. Make your own quarter-round, base mold, door and window stop, casing, tongue-and-groove... all popular patterns. Other Belsaw operators turn out picture frames, fencing, clock cases, furniture, bee hives, bed slats, surveyor's stakes... all kinds of millwork. Handles tough oak and walnut as easily as pine using only one small motor, and so simple to operate even beginners can use it.

**YOUR
 OWN
 BUSINESS
 Part Time
 or Full Time
 Right At
 Home!**

Men and women everywhere are using this one low-cost power-feed machine to start and build their own new businesses...and YOU can do the same. Supply lumberyards, carpenters and contractors in your area with door and window trim...base shoe...bed mold...cove and quarter round...ALL of their trim. You can sell picture frame to custom framing shops, paint stores, department stores and direct to users. All patterns available or design your own.

Get **FREE Booklet with facts and full details... RUSH COUPON TODAY!**

Does The Belsaw Pay? YOU BET!

READ WHAT BELSAW OWNERS SAY:

"I bought a batch of walnut in the rough, and after planing it on the Belsaw I figured I saved enough money to pay for two-thirds the cost of the Planer. It really does a good job."

R. S. Clark — Springfield, Ohio

"This machine pays for itself making money out of scrap boards. It is a very well built machine and I confess it is more than I really expected for the price. It does everything you say it will."

Stephen Schultz — Orangeville, Penna.

"I've been a planer man for years and am now retired. The Belsaw has earned me \$60,000 in eleven years...it's the best investment I ever made."

Robert Sawyer — Roseburg, Oregon

"I recommend the Belsaw as the most useful shop tool any craftsman could own. We use one every day in the Workbench model shop... couldn't get along without it."

Jay Hedden, Editor
 Workbench Magazine

**There is NO OBLIGATION and
 NO SALESMAN Will Call—ever!**

If coupon has been
 removed, just send
 postcard with name
 and address to:

BELSAW POWER TOOLS Co.
 932B Field Building
 Kansas City, MO 64111

BELSAW POWER TOOLS Co.
 932B Field Building
 Kansas City, MO 64111

**FREE
 BOOK**

☐ **YES, please send me the FREE Booklet that gives me complete facts about Belsaw's Planer-Molder-Saw and full details on how I can qualify for a 30-Day Free Trial right in my own shop. I understand there is No Obligation and that No Salesman will call.**

Name

Address

City

State Zip

COAL POWER

(Continued from page 67)

ing rivers for land reclamation. Ranchers and farmers in Wyoming, Montana and the Dakotas have joined together to fight the diversion of any irrigation water for the burgeoning coal industry. "Between the scant rainfall and low water tables," observes an energy analyst, "there's just not enough water to go around."

Water rights also are at the heart of dispute over moving future coal in slurry pipelines, currently the government's leading transportation option. To move the pulverized coal through underground pipes, vast quantities of water are needed: Five million gallons for every million tons of coal. Many westerners worry they'll be left high and dry as the pipelines draw precious water from the arid prairie.

So far, only one pipeline is operational, the 273-mile Black Mesa line that connects an Arizona coal mine with a Nevada power plant. Nine others have been proposed to link western mines with southeastern power plants. And scientists are actively seeking alternative ways to

move the coal slurry: with oil, methanol derived from coal or with water pumped from the Gulf of Mexico to the mine head. One plan even calls for recycling waste water from Midwestern cities like Omaha and Grand Rapids to move the coal.

But uncertainties remain. Congress is still locked in an economic dispute between slurry companies and railroad officials over who will carry the western coal to market, so environmental concerns have been shuffled aside temporarily. Yet whether such ecological issues will become permanently ignored is at the heart of the coal debate.

Despite the disruption of the land, the fouling of the air and the threat of climatic calamities, the shift to coal seems likely to continue. It's too important an energy source to ignore. But without careful planning and strict monitoring, doubling America's coal consumption also could double the nation's environmental hazards. **MI**

MICHAEL J. WEISS, a former technical editor with the General Accounting Office's Energy Division, is now a reporter for People and a contributing editor of The Washingtonian.



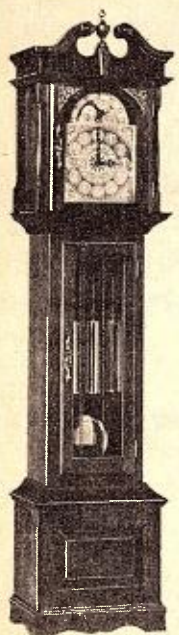
POSTER OFFER

For our April Home Improvement cover we asked noted cartoonist Jack Davis to use his imagination. The result—a parody of Grant Wood's *American Gothic*.

We were so enchanted with the results, we wanted to share it with our readers. But first, we asked Charles Osgood, CBS TV and radio commentator, to give our poster couple a voice in verse.

To order this 23 x 29-inch full-color reproduction (annotated with Osgood's poem, "Homeowner's Lament"), send a check or money order for \$4.50 plus \$5.00 postage and handling for each poster ordered to: Mechanix Illustrated, c/o Hamilton House, P.O. Box MG, Dept. 2070, 32275 Mally Rd., Madison Hts., MI. 48071.

FREE COLOR CATALOG



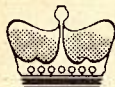
Build Your Own
Grandfather Clock
Prices Starting Under

\$250

(including movement
and dial)

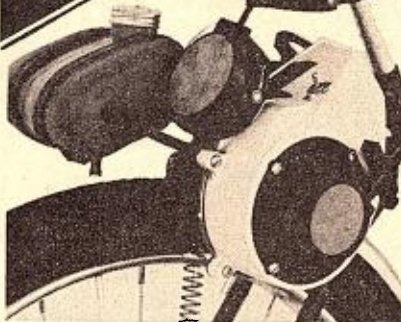
- Do-it-yourself case kit, parts pre-cut
- Finished clocks
- Solid 3/4" hardwoods: black walnut, cherry, oak
- Heirloom quality
- Factory direct prices
- Solid brass West German chiming movements
- Money back guarantee
- Prompt shipment

MASTERCARD and
VISA ACCEPTED



**EMPEROR®
CLOCK COMPANY**
WORLD'S LARGEST MANUFACTURER
OF GRANDFATHER CLOCKS
Dept. 819 Emperor Industrial Park
Fairhope, Alabama 36532

INSTANT
GAS SAVER!
JUST ADD A BIKE AND
GET 200 MPG AT SPEEDS
UP TO 35 MPH



FACTORY DIRECT **\$179.95**
SALE

Reg. \$199.95

Ride over 3,000 miles
FREE with special rebate offer

The air-cooled, 1.3 HP, 34 cc, 2-cycle BUMBLE-BIKE MOTOR installs easily with just two bolts. Motorcycle-type clutch and throttle controls. Does not interfere with normal pedaling. Satisfaction guaranteed.

WRITE FOR FREE BROCHURE
AND SPECIAL FACTORY REBATE OFFER

Bumble-Bike®
Dept. 12-5 P.O. Box 1116
Havana, FL 32333 U.S. Patent Pending

HOW-TO

A Money-Saving
Troweling Tips Booklet

TROWELING
TIPS and
TECHNIQUES

- 24-page illustrated booklet
- Easy to understand... saves you time
- List of tools needed for each job
- Tips on cement, block, and brick work; plaster repair and dry wall
- Used by many vocational schools and training centers
- Just 75¢ (includes mailing)

Send for your professional
troweling tips booklet today!

Enclosed is _____ for _____
"Troweling Tips" booklets at 75¢ each.

Name _____
Address _____
City _____
State _____ Zip _____

Send to:
Marshalltown Trowel Company
104 Eighth Avenue • Dept. MI-5
P.O. Box 738 • Marshalltown, Ia. 50158

Sunspace on a Deck

(Continued from page 66)

Framing the greenhouse is a relatively simple job. First, fashion the front frame using 2×4s, doubling the center and the two ends. Raise the frame and attach it to studs nailed to the house by running 2×4s horizontally between.

Frame the door opening to fit. We used a Sears storm door (Cat. No. 64AY22831NH): 80×32 in. Cut and notch the greenhouse rafters and install them using joist hangers on a ledger nailed to the house, fitting the notch into the 2×4 front framing.

Next, before installing the acrylic plastic (we used Rohm and Haas Plexiglas), stain the framing. To ensure that the Plexiglas has room to expand, drill the mounting holes oversize. The trim holds the material in place.

Build the planter located at the foot of the greenhouse perimeter, using 2×8s. Place an aluminum drip strip at the top of the front framing.

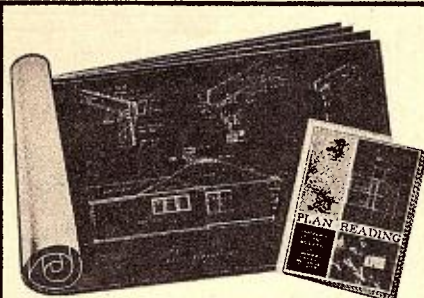
Installing the door is easy. Our door came with detailed instructions describing the proper installation of each of its elements. Make sure the framing strips are placed properly to ensure close clearance for the door's weather stripping. Now you're ready to caulk the glazing.

After installing hangers for the plants, lay a floor of ½-in. exterior plywood in the greenhouse and put in indoor-outdoor carpet.

Stain the deck and greenhouse with your color choice (we did ours in the same color as the existing deck) and get set to enjoy a number of seasons growing plants and, most likely, enjoying reduced heating bills in the bargain. **MI**



"Don't you think it's about time you retired and got to work?"



FREE BLUEPRINTS and TRIAL LESSON

—for your greater success in Building

Beginners, craftsmen, even foremen and superintendents, have sent for these free blueprints and trial lesson in Plan Reading as a means of trying out Chicago Tech's home-study Builders training. Learn how you can master Plan Reading—Estimating—and the practical details of all types of construction in your spare time at home. Mail coupon below or phone TOLL FREE—see how you, too can prepare for a better job—higher income, or start your own contracting business.

• PHONE TOLL FREE (24 HRS.)
1-800-528-6050 Ext. 810

CHICAGO TECH/School for Builders
1737 S. Michigan Avenue, Chicago, Ill. 60616

CHICAGO TECH/School for Builders
Dept. MI-51, 1737 S. Michigan Ave.
Chicago, Ill. 60616

Veterans
Check
Here ☐

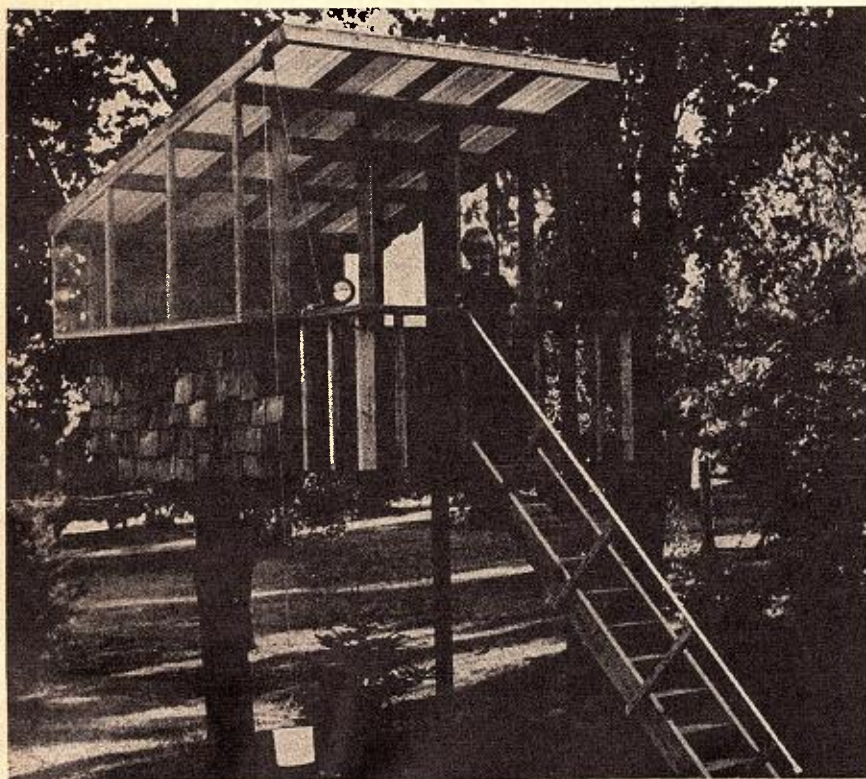
Please mail me a Free Trial Lesson, Blueprints and Builders Catalog. I understand there is no obligation—no salesman will call.

NAME _____ AGE _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

GOLDEN HAMMER

Win a full-size gold-plated Hammer or Tie Bar or a Certificate of Merit. Send a crisp black-and-white photo of your project to MI's Golden Hammer Awards, 1515 Broadway, New York, N.Y. 10036. Include negative, a brief description and also a stamped return envelope.

GOLDEN HAMMER AWARD WINNER



DON'T you wish you were a kid again—with a Dad who would build you a tree house for your birthday? Arnold Milbright made this wish come true for his four-year-old son.

The 6x8-foot tree house stands 7 feet off the ground and is supported by a maple tree and two steel pipes in cement. A railed staircase leads up to the entrance.

Arnold, a mechanical engineer from

Red Wing, Minnesota, chose translucent fiberglass for the roof to provide a brighter play area than traditional wood or shingles. The lower section of the house sports cedar shingles. The upper section, screened for safety, keeps out mosquitoes.

A 12-volt electrical system from a car battery powers a spotlight, two ceiling lights and a doorbell. A bucket hauls up toys—and lunch! **MI**

TIE BAR WINNERS

- James F. Stewart, Boise, Idaho
- L.T. Thibodeau, Falls Church, Va.
- James W. Pero, Great Falls, Mont.
- Roger W. Anson, Syracuse, N.Y.
- Thomas F. Hess, Muncy, Pa.
- Wilbur V. Lease, Newcastle, Wyo.

CERTIFICATES OF MERIT

- S.L. Friant, Auburn, Wash.
- Harold Bidakis, Fairlawn, N.J.
- Paul DeGrand, Cleveland, Ohio
- Anson Franklin, Canoga Park, Calif.
- W.R. Janda, South Ozone Park, N.Y.
- J.M. Raimer, Williamstown, Mass.

NOW! Get in on the PROFITS in SMALL ENGINE REPAIR!



Start your own money making business!

Work part time, full time—right at home—we help you every step of the way.

No doubt about it... as a small engine pro, you can cash in on the huge demand for qualified men in one of America's fastest growing industries. You'll be able to command top hourly rates of from \$10.00 to \$15.00 per hour—and that's just for labor. A simple tune-up earns as much as \$17.50 for less than an hours work, and parts, engines and accessories will add even more to the profits.

Plenty of business waiting for qualified men. 46,000,000 Small Engines Are In Use Today!

That's the official count from the Engine Service Assn., and one-million new engines are being built each month. With fully accredited Belsaw training, you can soon have the skill and knowledge to make top money servicing these engines. People will seek you out and pay you well to service their lawnmowers, tillers, edgers, power rakes, garden tractors, chain saws, minibikes, snowmobiles, generators, go-carts, paint sprayers, snowblowers...the list is almost endless.



NO EXPERIENCE NECESSARY!

You don't need to be a 'born mechanic' or have any prior experience. You can master this profitable trade right at home in your sparetime. Lessons are fully illustrated...so clear you can't go wrong, and with our famous 'learn-by-doing' method you get practical 'hands-on' experience. We also show you how to get business, what to charge, where to get supplies wholesale...all the inside tricks of the trade you need to assure success right from the start.

Send for FREE Facts—Do it TODAY!

NO Obligation—NO Salesman Calls!

You risk nothing by accepting this offer to see how easily you can learn the skills you need to increase your income in a high-profit business of your own. Just fill in and mail coupon below (or send postcard with name and address) to receive full information by return mail.

RUSH COUPON TODAY

**BELSAW INSTITUTE
522B FIELD BUILDING
KANSAS CITY, MO 64111**



FREE BOOKLET!
Send for your copy today!

**BELSAW INSTITUTE
522B FIELD BUILDING
KANSAS CITY, MO 64111**

Accredited Member
National Home Study Council



☐ YES, please send me the FREE booklet that gives full details about starting my own business in Small Engine Repair. I understand there is No Obligation and that No Salesman will call on me.

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____



Buyers Corner

For Advertising Rates, Write: David Phillips, Mail Order Mgr.

MECHANIX ILLUSTRATED 1515 Broadway, New York 10036

\$1.50 a gallon vs. 1/10¢ a mile



Electrify Your Bike!

Travel with PEDALPOWER®, low-cost electric drive for your bike or adult trike. Just 10¢ worth of electricity gives you 100 miles of effortless riding. Save on gas, taxis, stop begging rides from friends. Perfect for shopping, visiting, commuting, just plain fun!

PEDALPOWER fits men's, women's, children's bikes and adult trikes, installs in minutes without special tools. Safe single-lever handlebar control, instant start without pedaling, up to a 40-mile range on a single charge. Satisfaction guaranteed. Send coupon for free catalog showing PEDALPOWER motors, our unique Take-Apart bikes, and ready-to-ride adult trikes. Get PEDALPOWER and laugh at gas prices!

SEND COUPON FOR FREE CATALOG



5203 Mantua Blvd.,
Sewell, N.J. 08080

Rush me my FREE PEDALPOWER catalog by first-class mail.

Name _____

Street _____

City/State/Zip _____

BUILDING CLEANING MEANS BIG DOLLARS FOR YOU



**CLEAN • Brick • Stone
• Aluminum Siding**
Instantly, Safely, Low Cost

Spray-on, rinse-off method.
Factory training provided.

Send for FREE booklet,
complete details.

Write or call (216) 292-4727

National Surface Cleaning Corp.
4959 Commerce Parkway
Cleveland, OH 44128



THE TOOL WAREHOUSE

Name Brand Tools at 10% to 50% Off

S-K TOOLS Rockwell 1/2 H.P. BENCH GRINDER ALL BALL BEARING \$59.99 Retail \$119.98 HEAVY DUTY INDUSTRIAL QUALITY • 8" Wheels • 3450 RPM • 110/220 6" Wire Wheel and \$5.00 ea. add \$8.00 for shipping and handling	Milwaukee 1 H.P. 20 GAL. COMPRESSOR \$324.95 Retail \$536.00 • 115/230 • 40CFM at 100 • 2 Cylinders • 20 GAL. Tank OTHER MODELS AVAILABLE Accessories: Regulator Filter & Gauges \$35.00 25' Air Hose \$15.00 SHIPPED FRT. COLLECTY FROM NEAREST WAREHOUSE
---	--

UNIVERSAL WRENCH Complete wrench set in one tool \$5.35 Retail \$7.98 Grips 20 sizes 3/8 - 13/16 including metric add \$1.00 for shipping and handling	EDISON® 10" BAND SAW \$139.95 Retail \$174.95 • 10" Throat • 4" Depth • 1/2 HP Motor • 0-45 Table Extra Blades \$6.00 ea. 1/4 or 3/8 add \$8.00 for shipping and handling
---	--

SUPER DRIVER Ratchet Tool System Twice the Turning Power Half the Effort! \$4.99 Retail \$10.95 Complete with 4 Bits add \$1.25 shipping & handling	S-K TOOLS 20 PC. SOCKET SET \$29.99 Retail \$49.99 3/8 DRIVE #4520 STANDARD & DEEP SOCKET SET 17 Sockets 2 Extensions 1 Ratchet LIFETIME WARRANTY Add \$4.00 for shipping and handling
---	--

ORDER BY PHONE WITH M/C OR VISA
 800-645-9166 516-420-1420
 SEND \$1.00 FOR CATALOG
 CALL OR WRITE FOR OUR PRICE
 ON ANY NAME BRAND TOOL!
 SORRY NO C.O.D.'s
 PRICES FOR CONTINENTAL USA ONLY
 THE TOOL WAREHOUSE
 WILLOW PARK CENTER
 FARMINGDALE, N.Y. 11735
 Att. Dept. MI-580

Here's what one customer said:



"If I had the tools and materials to build my own bike from scratch, I don't think I could build one any better."
 John Jurenka,
 Santa Monica, CA

Save assembly costs when you build your rugged work or play machine (in just 6 - 12 hours) with an easy kit from Carl Heald, Inc. Choose from 10 bike, 8 trike models; engines from 5 to 16 H.P. All have Comet torque converters (no shifting); full suspension (smooth ride); tubular steel frames (shrugs off rough going). Optional electric start, lights for licensing, other accessories.

NEW VT-1012
 (10-hp)
 SUPER
 BRONC
 shown with
 accessories

Special Offer
 — One FREE
 accessory
 with bike or
 trike order!

Carl Heald, Inc.
 Dept. MI-85, P.O. Box 1148
 Benton Harbor, MI 49022
 Write today for free brochure

GEODESIC DOME HOMES



Enjoy super-low energy bills

Up to 50% more energy efficient, Monterey Domes remarkable geodesic home packages are inexpensive, super strong, and earthquake resistant. Easy to assemble color-coded shell packages take no skill, start at only \$3995. Many models up to 3,500 sq. ft. Send for exciting 90 page color catalog packet, including floor plan book and prices.

- ☐ Rush me your 90 page CATALOG & PLANS BOOK. Enclosed is \$6.00, postage included.
- ☐ Also send your ASSEMBLY MANUAL for an add'l \$5.00.

NAME _____
 ADDRESS _____
 CITY, STATE, ZIP _____
 Mail To: MONTEREY DOMES
 1855 Iowa, Dept. AM-5
 Riverside, Calif. 92517



CAR REPAIRS STEALING YOUR \$\$

Protect Yourself and those you care for with **THE GREAT CAR REPAIR RIPOFF** an invaluable 50+ page book which tells **HOW TO:**

- Find an honest, skilled mechanic
- Buy only needed service
- Detect and prevent fraud

Only \$4.95 while supplies last.

MAIL check or money order payable to:
 CONSINFO PRESS, Box 7, Atlanta, Georgia 30301

Send me _____ copies of **THE GREAT CAR REPAIR RIPOFF**. Enclosed find _____

Name _____
 Address _____
 City _____ State _____ Zip _____
 Satisfaction Guaranteed or Money Back
 Allow 4-6 weeks for delivery

"ELECTRONIC TREASURE HUNTING"

Find gold, silver, coins, relics and more with White's. Largest manufacturer of electronic mineral/metal detectors known worldwide. Take it with you when traveling - Great outdoor fun!

FOR YOUR NEAREST WHITE'S
 DEALER AND FREE CATALOG
 CALL TOLL FREE
 1-800/547-6911

\$59.95 and up

U.S. PATENTS.

WHITE'S ELECTRONICS, INC.
 Sweet Home, OR 97386 Dept. MA-1

GREAT SAUSAGE RECIPES

227 page illustrated book explains sausage making plus home curing and smoking of meat, fowl and fish. Over 100 recipes. Free equipment and supply catalog has more information. For yours, send to: **The SAUSAGE MAKER** Dept. 9
177 Military Rd. Buffalo, N.Y. 14207

STICK 'EM UP, AMERICA!

Our headline might be funny except that it describes our energy situation so well. Our patent file searches prove we can break our slavery to the energy industries. Proof is in our dynamite new book entitled "FREE ENERGY. A COLLECTION OF U.S. PATENTS". (NOT solar or wind energy). For full details, send your name, address, zip code:

THE FREE ENERGY PRESS Dept. M-5
P.O. Box 22469, Robbinsdale, Minnesota 55422

MODEL III DISCOUNT TRS-80® DEALER A301 COMPUTER SPECIALISTS



\$ Discount \$
on TRS-80's

26-3001 4K Color..... \$353.00
26-1062 16K III..... \$65.00
26-4002 64K I Drive..... \$440.00

1-800-841-0860 TOLL FREE
MICRO MANAGEMENT SYSTEMS, INC.
Downtown Plaza Shopping Center
115 C. Second Ave., S.W.
Cairo, Georgia 31728
(912) 377-7120 Ga. Phone No.

BUILD A BEAUTIFUL OUTDOOR DINING SET AND SAVE \$\$\$

EASY TO FOLLOW STEP BY STEP
INSTRUCTIONS & ILLUSTRATIONS

PLANS \$ 5

SEND CHECK OR MONEY ORDER TO:
EZDO DESIGNS

BOX 10952 SUITE 309, HOUSTON, TX. 77018



BEFORE

CALL TOLL FREE NOW!

AMAZING VINYL REPAIR —\$10 to \$20 in an hour!

Big earnings, repeat business. Car shops, homes, motels, restaurants, bars, etc. **FREE FACTS BY MAIL.**

Call toll-free (800) 621-5809 (ILL. 800/972-5858) or write VIP, 2021 Montrose, Dept. 172 Chicago, IL 60618

DUNE-BUG

Complete plans & specs on how to build or buy - disc. prices on parts, kits, engines, & raw material.



Send \$2 for Dune-Bug pkg to Box 987
MI-5 Azusa, CA 91702



Satellite TV

**We don't just sell information!
We Manufacture Hardware!**

Our 94-page catalog and information book tell the whole story! Inexpensive dishes, high pro-feeds, computer aiming software! Specs, kits and more! Send \$7.95 today!

24-hour C.O.D. Hotline © **SPACECOAST**
(305) 339-7600 RESEARCH CORPORATION
Dept. I P.O. Box 442, Altamonte Spgs, FL 32701

CLOCK COMPONENTS



Clock Movements: Battery, Quartz, Electric, Urgos Grandmother, Grandfather, Westminster & Triple Chime, 8 Day Key Winds & Westminster, Bim Bams, Barometers, Metal, Bezel, Paper dials, Hands, Brass & Plastic Numbers & Markers. Hundreds of Items. Quantity Prices. Send \$1.00 for 40 Page Catalog. Refunded on \$10.00 Order.

NEWPORT ENTERPRISES INC. Dept. G
2313 W. Burbank Blvd., Burbank, Calif. 91508

LEARN MEAT CUTTING



Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big pay, full-time jobs — **HAVE A PROFITABLE MARKET OF YOUR OWN!** Time payment plan available. Diploma given. Job help. Thousands of successful graduates. OUR 58th YEAR! Send approved. **NATIONAL SCHOOL OF MEAT CUTTING**, No 71-02-0197T, Dept. 52-Q, 33 N. Superior, Toledo, Ohio 43604.

BRING ON YOUR TOUGH JOBS



Mow 3 acres in an hour. Plow 8" deep. Front load 1/2-ton bucket loads into a pick-up. Till, cultivate, bulldoze, blow snow...get your tough jobs done fast!

Power King's dependable cast iron engine provides high-torque workpower. Rugged, all-gear drive delivers nearly 100% of engine power to big, ground-gripping drive wheels...squeezes more work out of every drop of fuel. Ground clearance up to 19" lets you cultivate tall crops and work in rough ground.

Get American-made Power King in 12, 14, 16 and 18 hp models and over 20 man-sized attachments. See your Power King Dealer for a test drive or write for free catalog.

POWER KING

ONE TOUGH TRACTOR

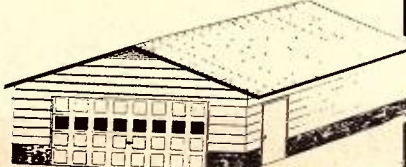
ENGINEERING PRODUCTS CO., INC. 1005-S5 ANOKA AVE., WAUKESHA, WI 53186

C-72

You can build this 2 1/2 car garage yourself.

A fast and economical way to have a 24'x24' garage. One man plank by plank instructions. Material and tool lists. Send \$6.95 for plan #17 to:

Quick and Easy Architecture
Echo Valley, Brandenburg, KY 40108



CUSTOM CHROME

WHEELWELL MOLDING

Easy to install. No tools, no fasteners. Fits any contour, any car, any truck. Adds beauty, protection. Till now, available only to new car dealers. Guaranteed to maintain shape & brilliance, or your money back. Set of 4, only \$19.95. Add \$2 for postage & handling. Residents add 6% tax.

Checks payable to B.S.I.

FLEXI-CHROME
P.O. Box 2596, La Jolla, CA 92038



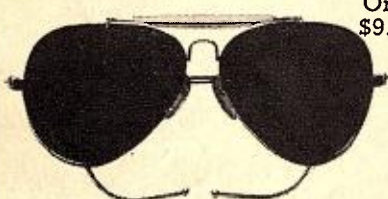
DIRECT FROM U.S. OPTICS QUALITY SUNGLASSES AT FACTORY PRICES

Each pair features: Impact resistant lenses • Handcrafted • Polished glass lenses • Hardened metal frames • No non-sense guarantee.
FREE—limited time only—deluxe velour lined case with each pair of glasses ordered (a \$3.00 value). Credit cards accepted. Dealer inquiries invited.
NOTICE: Don't be fooled by cheap imitations. These glasses are made exclusively for U.S. Optics. To make sure you get the best, order now and if not completely satisfied return for refund within 30 days.



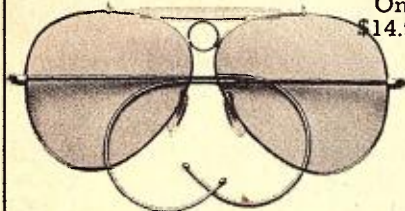
Only
\$7.95

World Famous Pilot's Glasses
These precision flight glasses are now available to the public for only \$7.95. If you could buy them elsewhere, they'd probably cost you over \$20.00. #20P available in gold or silver frame. A \$20.00 value only \$7.95. Two pairs for \$14.00.



Only
\$9.95

Aviator Teardrop Flight Glasses
Flexible cable temples. #30A gold frame only. A \$30.00 value only \$9.95.
2 pairs for \$18.00.



Only
\$14.95

Professional Driving & Shooting Glasses
Wide angle amber lens brightens visibility. #30D gold frame only. A \$30.00 value only \$14.95. 2 pairs for \$28.00.

To order send check or money order to U.S. Optics, Dept. 745, P.O. Box 14206, Atlanta, Georgia 30324. Credit card customers please fill in card # and Exp. date

QUANTITY	MODEL #	GOLD	SILVER	PRICE
20P	30A	X		
	30D	X		

Add Postage, Handling, and Insurance
\$1.00 per pair

Total _____

Visa or Master Charge # _____ Exp. Date _____

Name _____

Address _____

City _____ State _____ Zip _____

FREE case with each pair.

SEND FOR YOUR FREE VALUE PACKED 1981 AUTO PARTS AND ACCESSORIES CATALOG



NOW YOU CAN DO IT YOUR WAY

Repair or customize your auto using quality parts and accessories from Rick's. You can **SAVE** big money and get it done **RIGHT** when you do it yourself. You don't need to be a 'born mechanic' or have a huge collection of fancy tools. Our accessories come with easy-to-follow instructions—all you need to assure success. You risk nothing.

CALL TOLL FREE
1 (800) 228-2626

7 days, 24 hours

FOR YOUR FREE
1981 CATALOG

or if you wish fill out and
mail coupon below to:



SEND TO: RICK'S

2754 Roe Lane • 251
Kansas City, KS 66103

☐ **YES**, please send me Rick's 1981 Auto Parts and Accessories catalog. No obligation and no salesman will call.

NAME _____

ADDRESS _____ APT. NO. _____

CITY _____

STATE _____ ZIP _____

The Secret's Out!



You've heard it on the radio, read about it in magazines, and it's **TRUE. Magnets really do save gas.**

Our Gas Saver Magnet Kit #GM-4 can reduce gas and diesel fuel consumption from 2-7 miles per gallon. Independent laboratory tests proved it!

The kit works on any kind of car or truck, and comes with detailed instructions for quick, easy installation. No tools are required.

GM-4 Kits have sold nationally for \$14.95. Complete the coupon below to receive yours for only \$10. Money-back guarantee.

Send \$10 plus \$1 postage to:



607 S. Gilbert, Castle Rock, CO 80104

Please send me one Gas Saver Magnet Kit for each of my _____ vehicles at \$10 each _____

MX _____ plus \$1 postage for each Kit _____

Total amount enclosed in check or money order _____

Name _____

Address _____

City _____

State _____ Zip _____

MAKE TOP MONEY IN STAINED GLASS



Learn at home in your spare time. We have taught the art of Stained Glass from age 15 to 60. Our program includes completely illustrated lessons— all professional tools, interesting projects, and more. Everything needed to start you on your way to success. You can earn big money working from your home or a studio, making new stained glass lamp shades, windows, jewelry, sun catchers and the restoration of antique stained glass pieces. For information send \$1.00 to:
REGINA CAREERS, LTD., Dept. MG-51
33 E. Main Street, Round Lake Park, Illinois 60073



TRAILER FOR THE 80's—Burro Travel Trailer kit sleeps four. Under 1,000 lbs. Fiberglass. Ready to tow. Finish interior only. Write Burro MI-5, 14143-21st Avenue North, Plymouth, MN 55441. For full color catalog send \$2.00 to cover postage and handling. **Dealers Wanted.**

Toyota Land Cruiser

PARTS AND ACCESSORIES BY NATION'S LARGEST INDEPENDENT L/C SPECIALIST FAST UPS AND MAIL DELIVERY SERVICE—SEND \$1.00 FOR CATALOG—SAVE ON STANDARD AND SPECIAL HEAVY DUTY PARTS. SEVERAL WESTERN WAREHOUSE LOCATIONS MANY OVERSEAS CUSTOMERS MANY PARTS NOT AVAILABLE ELSEWHERE DECADE OF EXPERIENCE (213) 991-6697

MAN-A-FRE INC.

5075 Chesbro Rd. Agoura, CA. 91301 (213) 991-6697

LICKITY CHIPSTER TOUGHEST BRUSH CHIPSTER

Chips limbs up to 2" diameter; mulches, pulverizes shrubby clippings into a fine mulch. Use residue from material now wasted into usable mulch. Has wide axle, long tongue. Can be towed.

For complete details, no obligation, write:

Piqua Engineering, Inc., Dept. MI, Box 685, Piqua, OH 45356

OFFER EXPIRES MAY 31

Hardened Steel. For filing, drilling, milling, carving, routing any metal or wood. Cutting edges from 1/4" to 1", all shanks 1/4". Brand new in air-tight G.I. packs.

32-Tool Set, G.I. cost \$295.00 now \$24.00
14-Tool Set, G.I. cost \$126.00 now \$18.00
Save Even More, Both Sets now \$36.00
Two \$36. Sets (Limited Time) \$56.00
Money Back Guarantee. Add \$3.00 for shipping
Texas orders add 5% tax. Export orders add 14.
U.S. SURPLUS CENTER, Dept. 507
715 Camden, San Antonio, Texas 78215

Prospect by phone electronically!

Telematic

4880 49th Street, North
St. Petersburg, FL 33709
(813) 525-5586

1000 CALLS PER DAY AUTOMATICALLY

TABCO STEEL BODY PARTS FOR IMPORTED CARS

Over 700 fenders, doorskins, rocker panels, rear quarter sections and other replacement panels simplify rust or collision repair on most import cars. Discount prices. Available in Canada. Send \$2.00 for illustrated catalog. **DEALER INQUIRIES INVITED.**

P.O. Box 39474 • Dept. MX • Cleveland, Ohio 44139
(216) 248-5151

MONEYTREE

Our new book will literally show you how to create a MONEY-TREE for yourself. Your income will grow and grow—guaranteed! Send \$10 for complete book and all materials, or send stamped SAE for details. **Universal Publishing, Dept. 47 • 424 N. Austin, Oak Park, Ill. 60302 (47)**

BREW YOUR OWN FUEL

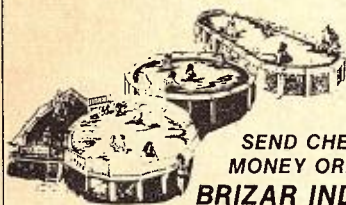
BROWN'S ALCOHOL MOTOR FUEL COOKBOOK

Contains step-by-step procedures for the making and using alcohol as a motor fuel. How to build your own home still, how to modify your car's carburetor to run on alcohol & other engine modification to get up to 100 miles per gallon, & much more. Loaded with large clear photo's, you'll be amazed at how easy it really is. Don't hesitate order your copy today!
Book No. 300 \$9.95 postpaid

DESERT PUBLICATIONS
DEPT. MI—CORNVILLE, ARIZONA 86325

FANTASTIC - NEW SOLAR POOL HEATER. WILL TURN YOUR POOL INTO A SPA.

DO-IT-YOURSELF FOR UNDER \$100.—
ON READY AVAILABLE MATERIALS.
ONLY \$8.— FOR THE PLANS AND
INSTRUCTIONS.



SEND CHECK OR
MONEY ORDER TO:
BRIZARD IND. INC.

P.O. BOX 3423 WAYNE, N.J. 07470

Telephone Listening Device

Record telephone conversations in your
office or home. Connects between any
cassette or tape recorder and your
telephone or telephone LINE. Starts
automatically when phone is answered.
Records both sides of phone conversation.
Stops recorder when phone is hung up.
This device is not an answering service.



Each
\$18.95
Qty. Disc. Avail.

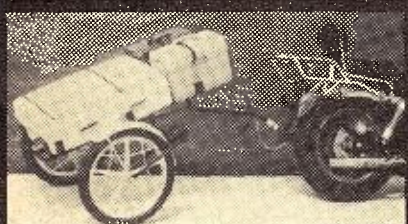
Super Powerful Wireless Mic

10 times more powerful than other mics.
Transmits up to 1/4 mile to any FM radio.
Easy to assemble kit. 15V battery (not incl.)
Call (305) 725-1000 or send \$18.95 + \$1.00 shipping per
item to USI Corp., P.O. Box MX-2052, Melbourne, FL 32901.
COD's except. For catalog of transmitters, voice scramblers
and other specialty items, enclose \$2.00 to USI Corp.



size 2"x3"x4"

CYCLE SULKY CARRYING SYSTEM FROM \$269.95 SMALL CAR • MOTORCYCLE • MOPED • BICYCLE



WRITE FOR FREE FULL COLOR BROCHURE
CYCLE SULKY P.O. BOX 702
TAYLOR, MI 48180

Be a DIESEL MECHANIC



Train at home in spare time—No previous
experience needed! Experts show you what
to do, how to do it. No need to quit your
present job or school. Easy-to-follow
lessons with plenty of pictures cover
everything you need to know to be a
diesel mechanic. Approved for veterans.
Send for free facts! No salesman will call.

ICS Diesel School, Dept. PA041
ICS Center, Scranton, PA 18515

Custom Quality FOLDING SPORTSMAN'S KNIFE

AN OUTDOOR POCKET KNIFE WITH FEATURES
WORTH FOUR TIMES THE PRICE. RETURN FOR
REPLACEMENT IF BROKEN WITHIN TEN YEARS.

4" model (7 1/4" open) \$4.25
plus 50¢ postage & handling

3" model (5 1/2" open) \$3.50
plus 50¢ postage & handling

HANDMADE STYLING

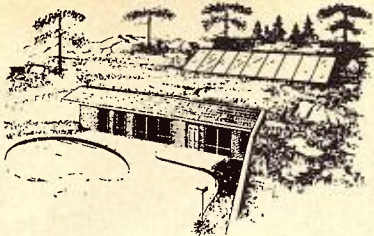
- Solid Brass
Bolster & Lining
- Rosewood Handle
- Sharp Stainless Steel
Safety-Locking Blade

Leather Holster
**MONEY BACK
GUARANTEE**

FOR 3 OR MORE
KNIVES, WE PAY
POSTAGE
pocketable
size

EGBERT Co. Dept. MI-051
11055 Sunset Blvd.
Los Angeles, CA. 90049

Underground Homes



□ **The Primer To Earth Sheltered Living** —
24 Page Booklet gives basic information on
underground homes — advantages, site
selection, planning, financing, building tips,
construction and landscaping. \$3.50 ppd.

□ **Plans For The Future** —
44 Page Book features full color renditions of
25 different underground home designs, plus
floor plans. Blueprints available. \$7.95 ppd.
Order Today! Satisfaction Guaranteed.

Underground Homes • Dept. M15
700 Masonic Bldg. • Portsmouth, OH 45662

WHAT'S HE DOING?

Making a Concrete
Flower Pot! ... and
SO CAN YOU!



Make and sell your own
Ornamental Concrete items.
Rush \$5.00 for Book
about Aluminum Molds
with prices and production trade secrets
direct from world's largest mold manufacturer.
Over 350 designs to select from.

Send \$5.00 **CONCRETE MACHINERY COMPANY**

Today To ➤ P.O. BOX C99 - HICKORY, N.C. 28601

TILLER USERS...

Can your machine
do all of this?

- ★ Handle with just ONE HAND.
- ★ EVENLY break, turn & till soil.
- ★ Shred vegetation without tangling.
- ★ Leave NO WHEELMARKS or FOOTPRINTS.

The TROY-BILT® ROTO TILLER-POWER COM-
POSTER can do all this and more! That's why
serious gardeners consider it the
finest tiller available. See for
yourself! For complete details,
"OFF-SEASON" SAVINGS, and
FREE 24-page booklet clip this
and mail today to:



TROY-BILT® Tillers
102nd St. &
Ninth Ave.,
Troy, N.Y. 12180

TROY-BILT® Roto Tiller-Power Composters
Dept. A747
102nd St. & 9th Ave., Troy, N.Y. 12180

Please send the whole wonderful story of Troy-
Bilt® Roto Tillers including prices and "OFF-
SEASON" SAVINGS now in effect for a limited time.
(Please Print Clearly)

Mr. _____
Mrs. _____
Ms. _____
Address _____
City _____
State _____ Zip _____

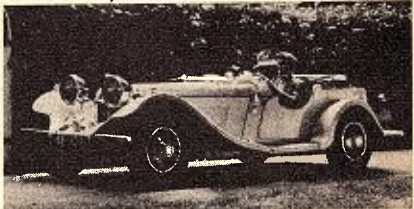
130 FULL SIZE SPORTS CARS You Can Build from Kits

Kit Cars



Just Published
Giant Buyers Guide
160 Pages, 500 Photos

Discover 130 full-size kit-
built sports cars like the one
shown here. Most sell for a
fraction of their apparent value
and virtually all are easy to
assemble at home. See and
compare all the latest kit cars
and manufacturers. Brand
new Buyers Guide is packed
full of Photos • Specs • Comparisons • Tech Data • Articles.
Everything from 40 mpg roadsters to sizzling V8s and electric
conversions. Hundreds of dollars worth of valuable information
not available anywhere else.



★ 14 Day Money Back Guarantee ★

AUTO LOGIC PUBL. Please mail my copy
P.O. Box 2073 □ \$8 (3rd Class. US only)
Department MI581 □ \$11 (1st Class. US/Can.)
Wilmington, DE 19899 □ \$12 (Foreign Air)

Name _____ (print)
Address _____
City _____ State _____ Zip _____

☐ Master Charge ☐ Visa Exp. Date _____

Order TOLL-FREE by phone.
Master Charge or VISA REQUIRED!
(800) 331-1000 Day or Night.
(918) 664-8300 in Okla. call collect.

DOUBLE-WALL INSULATED SOLAR GREENHOUSES

ALL STYLES &
WINDOW UNITS FROM JUST... **\$399**

SOLAR QUICK-MOUNT PANELS FOR SKYLIGHTS, WALLS, ROOFS

AS LOW
AS JUST... **\$315**
SQ. FT.

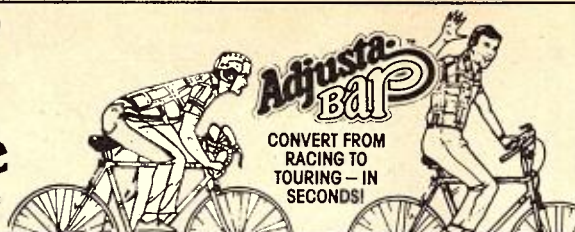
SOLAR
STRUCTURES & ACCESSORIES
THAT HELP HEAT YOUR HOME
AND QUALIFIES YOU FOR A

**40% TAX
CREDIT!**

COLOR BROCHURE \$1, SENT FIRST CLASS

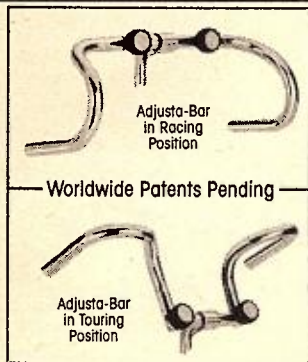
**SOLAR
STRUCTURES
DIVISION** VEGETABLE FACTORY, INC.
P.O. Box 2235, Dept. A270
New York, NY 10163
Or Call: (212) 867-0113

NEW Adjustable Handlebar



Adjusta-Bar
CONVERT FROM RACING TO TOURING—IN SECONDS!

GIVES CHOICE OF FOUR POSITIONS TO RELIEVE SORE BACKS, NUMB HANDS. TURNS YOUR 10-SPEED BIKE INTO A WHOLE FAMILY BIKE.



Now you can free your bike — and yourself — from conventional 10-speed fixed position handlebars. Imagine the versatility and the comfort this option offers to accommodate the riding style of everyone in your family. And the new Adjusta-Bar handlebar makes it all possible in seconds — with the turn of the adjusting knobs.

The adjustable handlebar has been long overdue — observe your friends and neighbors, you'll see them riding upright with hands on the crossbar rather than riding in the crouched-down, uncomfortable racing position. Bike riders everywhere are discovering that changing the riding position frequently, and riding upright is more comfortable and offers quick relief from numb hands, sore backs and shoulders.

The Adjusta-Bar with optional handlebar positions provides the solution for Total Comfort! Relief from Bicycle Fatigue! Better Visibility! Safety! Order today and enjoy new riding comfort and freedom. Delivered complete with installation instructions... Use coupon below or phone.

\$28.95
Made in U.S.A.

NO TOOLS REQUIRED! Adjusta-Bar fits all standard 10-speed frames. Hand brakes always remain in proper position. Light-weight, yet rugged, all-steel chrome-plated construction.

30-DAY Money Back Guarantee
If not satisfied

Adjusting knobs are grooved for positive grip. Reflector surfaces — a safety feature for night riding.

KANE PRODUCTS INC.
5725 CANAL ROAD • CLEVELAND, OHIO 44125
USE COUPON OR PHONE TOLL FREE
1-800/321-8686
in Ohio Phone 1-216/524-9962

Kane Products Inc., 5725 Canal Rd., Cleveland, Ohio, 44125

☐ Send **Adjusta-Bars @ \$28.95**
Add \$2.00 for handling & shipping.
(Ohio residents add 6½ % sales tax.)

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
☐ Enclosed check or money order ☐ Master charge ☐ Visa
ACCOUNT NO. _____ EXP. DATE _____

BUILD YOUR OWN TUCK-A-WAY CHALET!
A DREAM NEST FOR RECREATION. STARTER HOME. OR BACKYARD CABIN FOR THE KIDS! AMAZINGLY EASY AND ECONOMICAL TO BUILD. USE STANDARD TOOLS AND MATERIALS. NO BUILDING EXPERIENCE NECESSARY.
DESIGNED FOR MODULAR HOUSING
FOR INFORMATION PACKET & FLOOR PLANS RUSH \$3.00 TODAY TO CHALET • DEPT. 3 • P.O. BOX 1672 BIRMINGHAM AL 35202

Splits EASIER & FASTER! THE BOSS LOG SPLITTER!
Only \$49.95 plus \$5 p. & h. for adaptable cone, or \$99.95 plus \$8 ready-to-attach to hub of car or light truck (specify vehicle). Pa. — send 6% sales tax. Free info — send stamped self addressed envelope. Good Products, Route 3 Box 88-A MI, Kutztown, Pa. 19530

39.95 30 CHANNEL CABLE TV CONVERTER
ADD \$2.99 FOR POSTAGE
ORDER No. 176AE047
ETCO ROUTE 9N. PLATTSBURGH, N.Y. 12901 Tel.: (518) 561-8700.
FREE! UNUSUAL 96 PAGE ELECTRONIC PARTS & IDEAS CATALOG!

BUILD THIS TRAILER KIT! Heavy duty steel pre-cut. 7000 lb. axles. Haul cars, tractors, freight, etc. For Personal use or Resale. Good money-Full or Part Time. Send for prices or \$20.00 for Instruction Booklet-Refundable. **TRAILERMAKER 1428 No. Jefferson Mt. Pleasant, Texas 75455**

SATELLITE TV
Make your first investment in Satellite TV the intelligent one!
* Complete Handbook & Buyers Guide - detailed, yet simple to understand. Includes equipment costs, kits, turnkey manufacturers — \$7.95.
* Comp-Sat Location Analysis - 6-page computer print out locates all 11 satellites. A must for any station. Send zip code, longitude & latitude or nearest intersection. — \$9.95
* Both of the above for only \$15.95.
INTERNATIONAL COMMUNICATIONS CO.
P.O. BOX 25036 CHARLOTTE, N.C. 28212

EARN \$50,000 A YEAR
as a painting contractor. No previous painting or business experience needed. Well known, successful professionals share trade secrets in easy-to-follow manual form. Write today for free details:
Painting Contractor's Institute
P.O. Box 528 O • Deerfield, IL 60015

EASY TO BUILD PLANS AND INSTRUCTIONS for:
Go Kart\$2.50
Mini Bike\$2.00
Mini Car\$3.00
Pedal Boat\$4.00
12' Sail Boat\$4.00
Front Traction Go-Kart With Gearless Differential \$10.00
Mini Jeep\$3.00
8 H.P. Tractor \$10.00
Soap Box\$3.00
MINI VEHICLES PLANS
"Dept. H" — Chazy, N.Y. 12921

GASAHOL STILL
Build this 20 gal. still for \$58.00. Buy all parts at local hardware store. Need only 7 hand tools. Takes only 8 hrs. to build. Complete illustrated step-by-step booklet with recipe for fuel. How to obtain simple permit. Electric Powered. Simply plug it in. Send \$5.00 today to:
GASAHOL STILL
Box 660-P, Lindseyville, KY, 42257

FOR SPEEDIER DELIVERY PLEASE USE YOUR ZIP CODE

© P.C.A.

Advertisement

CB-098

A little-known business almost anyone can start from home for \$60 and make up to \$100,000/year

A man from Canton, Ohio, Ben Swartz, has discovered a unique, truly remarkable business. He made modifications to an old, little-known business and came up with what is now being called SuperBiz.



Ben Swartz

hours. It is also possible with SuperBiz to make \$80,000 clear profit in as little as two weeks.

SuperBiz is not a salesman's job, franchise, real estate or pyramid scheme. It is not only legal, it will bring you prestige and recognition, because it fills a desperate need in our society.

Additional, detailed information on SuperBiz is available for a one dollar postage and handling charge.

To order: (1) Get a blank piece of paper; (2) At the top print the word "SuperBiz" (3) Print your name and address; (4) Mail this along with \$1.00 for postage and handling, in cash, check or money order to SuperBiz: Dept. G-21, SuperBiz Square, Canton, Ohio 44767.

SuperBiz can be started from your kitchen table for \$60 and you can make up to \$100,000 a year right from your home, part time if you wish. It does not require business knowledge, experience, talent, inventiveness or capital.

In some cases, a SuperBiz project can be put together in an hour and start bringing in money in 24

Housing Breakthrough!

ONE MAN SAWMILL

NOW! BEAT Inflation and HIGH Lumberyard Prices!
No need to stop your important projects.
Take this portable mill right to the trees—turn out smooth true lumber every time—no experience needed. Saw your own logs or lumber for others and make excellent spare-time income—no crew needed. Use any power—tractor PTO, diesel, electric. Time payments may be arranged. Send for FREE details—mail coupon below or postcard TODAY! No Obligation and No Salesman Will Call.

World Famous Since 1928

BELSAW MACHINERY Co., 332B Field Bldg. Kansas City, Mo. 64111

Name _____ (Please Print) _____

Address _____

City/State _____ Zip _____

SEND FOR FREE COUPON TODAY!

Learn how to MAKE MONEY in DRAFTING

APPROVED FOR VETERANS

Train at home in spare time. No previous experience needed. Tools and materials included with course. No special talent required. We show you what to do, how to do it. **LEARN DRAFTING! AT HOME!**

NAME _____ AGE _____

CITY _____ STATE _____ ZIP _____

NORTH AMERICAN SCHOOL OF DRAFTING,
4500 Campus Dr., Dept. PA041, Newport Beach, CA 92660

Accredited National Home Study Council

FREE HOT WATER Solar Collector Plans

Fantastic Savings! Build your own Flat Plate Solar Collectors using our professional plans and photos. Made with copper tubing & other easily available materials. Similar to higher priced commercial units. Complete plan for \$10.00.

C&R ENGINEERING Box 204 Dept. MI
Lake Grove, NY 11755

THE ORIGINAL BASEMENT TOILET

Genuine Porcelain

FLUSHES UP TO
SEWER OR SEPTIC TANK

-No Digging Up Floors-
INSTALLS EASY. ANYWHERE!

Write **McPHERSON, Inc., Dept. MI**
Box 15133 Tampa, Florida 33684

MUSCLES

HOW TO BUILD A MORE POWERFUL BODY!!

- Wider Shoulders • Bigger Arms • Powerful Chest
- Trimmer Waist • Lose Fat • Gain Weight • And get a V-SHAPED BODY!!

[FREE BOOKLET!]

Universal, Dept. C
Box 6694
Detroit, MI 48240

RICKA DUO-WHEEL CONVERSION KIT AND FIBERGLASS FENDERS

New wide tire adapters & fenders to fit most mini - 1/2, 3/4 & 1 ton trucks. Simple bolt on installation. Increases traction, tire capacity & life.

The ultimate in safety protection for your family.

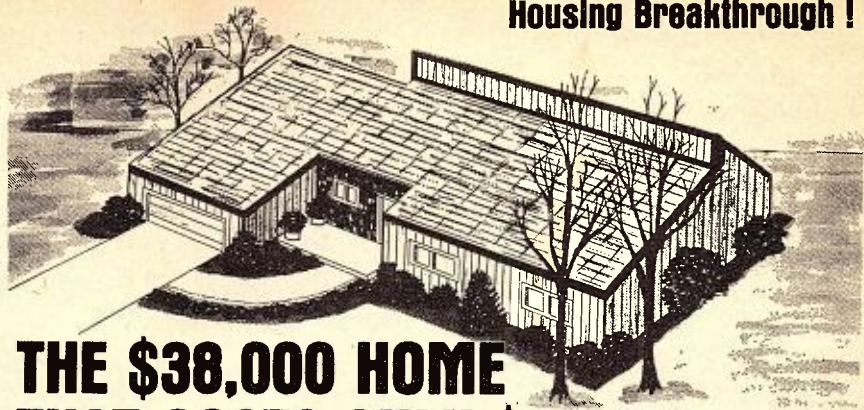
RICKA MFG. DEPT. RMI-5
Pequot Lakes, MN 56472

VISA MasterCard

110 VOLT A.C. GENERATORS

60 cycles, 3000 watts. Wt. 27 pounds, 5"x10". Fanbelt driven from car or pickup. Operates T.V., all power tools. Over 17,000 in service. This is our 31st year. Guaranteed 6 months. \$189.00. Our X1200-watt generator needs no battery. Special price—\$179.00. Add \$7.50 for Postage & handling per unit. Send for free catalog.

Virden Perma-Bilt, P.O. Box 7160 MI, 2821 Mays, Amarillo, Texas 79109. Phone 808-352-2761



THE \$38,000 HOME THAT COSTS ONLY \$7,500!

You can build this beautiful 3 bedroom, 1140 sq.ft. home for less than \$7500, while you cut your heating & cooling bills 50%. It's incredible but it's true! Let HOME KIT "80" show you how easy it is to build a home so inexpensive that you may never have to pay a mortgage payment again! The "80" uses energy saving & building techniques that slash building costs to the bone without sacrificing quality.

The do-it-yourself HOME KIT "80" package includes 3 sets of building prints, special instructions, and easy to use material lists that show you how little the "80" costs. Thousands have discovered how to turn the tables on the high cost of home ownership.

If you want even more low-cost energy saving homes to choose from, order the HOME PRICER PLANNING BOOK. It contains 50 home designs with floor plans & material lists that show you exactly what you need for any style you choose. As a special bonus HOME PRICER includes a little known trick on how to build a home with as little as \$500 working capital.

After receiving your Home Kit "80" package, if you don't agree it's the answer to your housing needs, return the material within 30 days to promptly get every red cent back. Even further assurance that your modest investment is absolutely safe.

Send for both today at absolutely no risk. The longer you wait the higher material prices go.

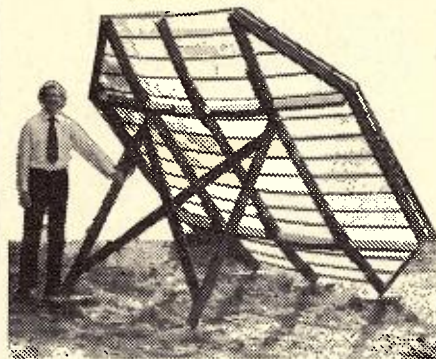
HOTLINE SERVICE:

Call 814-833-2620,
10 am. - 4 pm.
E.D.T. Visa
Master
Chg. or
C.O.D.'s
accept-
ed.

30 Day Money Back Guarantee -
TANTON PRESS Dept. MI-581 2427 W. 25th St Erie, PA. 16506
☐ \$8.00 for Home Kit "80" ☐ \$10.00 for Home Pricer.
☐ \$15.00 for both, saving you \$3.00! ☐ Or send \$1.00 for information pkg. In Canada please add 20%.

NAME _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____

Enjoy SATELLITE TV Now



It's easy. A backyard dish antenna like the one above lets you enjoy everything cable subscribers get—and more. Watch movies, sports, news, family and adult entertainment. Over 100 TV and radio services.

Only 3 parts are needed, a dish antenna, LNA pream-

plifier and receiver. Let Global TV Electronics show you how to build a video system the family can enjoy. Our big (8x11 in.) book is loaded with installation details, plan descriptions, antenna aiming routines and signal strength maps. It tells everything and your satisfaction is guaranteed. Even if you want to build it all from scratch, we show complete kit and part sources and much more. Order today.

GLOBAL TV ELECTRONICS

P. O. Box 219-F, Maitland, Florida 32751
Send \$7.95 Today! Add \$2.00 for 1st class (airmail)
or call our 24 hour C.O.D. Rush order line (305) 862-5068

Name _____

Full Address _____

If you've ever said... "There must be a better way to earn a living..."

Send for free facts and color brochure that could start you on the way to a satisfying new career.

It happens to all of us, sooner or later. No matter what kind of job we have. One day, it suddenly strikes home that we're going to have to work for a living the rest of our lives. And most of us are unhappy with the thought of forever being locked into the jobs we now hold.

"Surely," we tell ourselves, "there must be a way to get more satisfaction out of working. Surely, there must be a way to find a job that's more enjoyable. Yes, there must be a better way to earn a living!"

If you have been thinking these same thoughts, you'll find one of our free Career Brochures very helpful at this time. We invite you to send for one.

Your free brochure will describe the opportunities you might expect in the career field of your choice. It will also explain how ICS can train you for this new career field...right in your own home...in your spare time.

Of course, no school—not even ICS—can guarantee you a better job. But ICS can give you the first-rate training you need—especially if you're interested in one of the growing careers where ICS concentrates its training.

Earn a College Degree at Home

You can even earn a college degree at home from the ICS Center for Degree Studies. An Associate in Specialized Business Degree in Accounting or Business Management or Associate in Specialized Technology Degree in Civil Engineering, Mechanical Engineering, Electrical Engineering or Electronics. These are



practical, career-oriented programs designed to help you reach your objectives without further academic training.

An Ideal Way to Learn

As an ICS student, you study at home, on your own schedule. You waste no time traveling to and from class. And you never have to miss a paycheck.

But you're never alone. Skilled instructors are ready to help you with any problems that arise. If you ever need help with your studies, you can call ICS from anywhere in the continental United States or Canada using our special toll-free Dial-a-Question* service.

No one can promise success, but if you want more—more security, more day-to-day satisfaction and more future—send for free facts and the color brochure of your choice. Get started in the right direction. Complete and mail the coupon today. There's no obligation.

Remember, it's your life. You should make the most of it.

To get free facts and color brochure with full information
Pick the field that interests you most
and check the box next to "FREE"

CHECK ONLY ONE BOX

<input type="checkbox"/> FREE FACTS COLLEGE DEGREE IN ELECTRICAL ENGINEERING	<input type="checkbox"/> FREE FACTS COLLEGE DEGREE IN BUSINESS MANAGEMENT	<input type="checkbox"/> FREE FACTS DIESEL MECHANICS	<input type="checkbox"/> FREE FACTS INTERIOR DESIGN	<input type="checkbox"/> FREE FACTS BOOKKEEPING	<input type="checkbox"/> FREE FACTS HIGH SCHOOL
<input type="checkbox"/> FREE FACTS COLLEGE DEGREE IN MECHANICAL ENGINEERING	<input type="checkbox"/> FREE FACTS COLLEGE DEGREE IN ACCOUNTING	<input type="checkbox"/> FREE FACTS ELECTRONICS	<input type="checkbox"/> FREE FACTS APPLIANCE SERVICING	<input type="checkbox"/> FREE FACTS MOTEL-RESTAURANT MANAGEMENT	<input type="checkbox"/> FREE FACTS SMALL BUSINESS MANAGER
<input type="checkbox"/> FREE FACTS COLLEGE DEGREE IN CIVIL ENGINEERING	<input type="checkbox"/> FREE FACTS AUTO BODY REPAIR	<input type="checkbox"/> FREE FACTS AUTO MECHANICS	<input type="checkbox"/> FREE FACTS SURVEYING & MAPPING	<input type="checkbox"/> FREE FACTS CARPENTRY	<input type="checkbox"/> FREE FACTS TV SERVICING
<input type="checkbox"/> FREE FACTS COLLEGE DEGREE IN ELECTRONICS	<input type="checkbox"/> FREE FACTS ELECTRICIAN	<input type="checkbox"/> FREE FACTS AIR CONDITIONING	<input type="checkbox"/> FREE FACTS DRAFTING	<input type="checkbox"/> FREE FACTS HOME BUILDING	<input type="checkbox"/> FREE FACTS PLUMBING

ICS International Correspondence Schools Dept. PAS41
SINCE 1891 ICS CENTER, Scranton, Pennsylvania 18515

Please send me free facts, color brochure and full information about the career I have chosen. I understand I am under no obligation and no salesman will call. CHECK ONE BOX (ABOVE) ONLY.

NAME _____ AGE _____

ADDRESS _____

CITY/STATE/ZIP _____

TELEPHONE area code () _____

Veterans: Most ICS career programs qualify for V.A. benefits.

Read what these outstanding ICS graduates think of their training.

Chance to use brains.

"As a switchboard operator I never got a chance to use my brains. So I began the ICS Accounting program and became the internal accountant for a local company."
—Ellen Garza, San Diego, CA

His own boss at 27. "I'm only 27, but thanks to ICS I'm an electrician with my own contracting business. Without ICS I'd still be taking orders from everyone."
—Wm. DeMedio, Norristown, PA

Starts Manufacturing Firm. "With what I got from the ICS Engineering and Business Management programs, I have started my own company making parts for industry."
—Ron Jakubas, Jackson, MI

Obviously, we can't promise you'll be as successful as the outstanding graduates above but you will get the same high quality of training.



BUILD YOUR OWN STORAGE BUILDING

Imagine yourself the builder of this attractive All Purpose Barn 24' by 36' by 18' high with easy to follow plans. Appealing to the eye in suburban, farm, ranch, lake area. Many uses as 3 or 4 car garage, boats, campers, store, lodge. Plans call for concrete floor, ceiling joist, plywood loft flooring, suggested window and door locations. Send \$10.00 for plans and material list. 24' by 36' Horse Barn Plans showing 3 stalls, tack room \$12.00. Send 50¢ for brochure on other projects to build.
Hammond Barns, Dept. MI-81-5 Box 584, 3130 Hardacre Court, New Castle, Ind. 47362.

SEA EAGLE

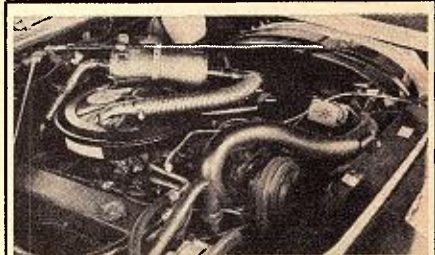
The Quality Alternative to High-Cost Inflatables



Why pay \$600. to \$1000. for an inflatable tender?

Sea Eagle inflatables pack small, last years and cost \$100.—\$220. Write for FREE brochure.

Sea Eagle,
Dept. MX5,
St. James, NY 11780
phone 516-724-8900



You are looking at an **EXHAUST RECLAIMING SYSTEM**, developed after 18 months research; resulting in less gasoline consumption and more miles per gallon. The **EXHAUST RECLAIMER** works in conjunction with a moisture and alcohol injector along with other components. This system can be made and installed in a home workshop using the complete step by step instructions and detailed illustrations contained in my brochure. Your vehicle need not be out of service for an extended period of time. All parts can be made at home and optional components purchased at an auto parts store.

I AM NOT IN THE BUSINESS OF SELLING OR ENDORSING ANY MANUFACTURED ITEM.

For your way to beat the high cost of gasoline, tune-ups and repairs, order your brochure today.

Send \$8.95 check or money order to:

M. D. Van

P.O. Box 10248

Ft. Worth, TX 76114

NOTE: This system cannot be applied to any fuel injected or diesel operated engines.

**NEW
MAG II**



EXTRA CASH WITH A STRUCK-KIT CRAWLER TRACTOR

More efficient dozer power and high maneuverability for larger gardens, snow removal, complete land scape projects. Up to 16 h.p. Over 30 attachments incl. all garden tools, dozer blade, hydraulic loader, backhoe. Factory direct savings. Unique, popular, **EASILY ASSEMBLED KIT**. Odd job and resale opportunities are great.



STRUCK KIT, Dept. MI51 Cedarburg, WI 53012
☐ Catalog showing Struck Tractor Kit construction & uses (specify Magnatrac or Mini-Dozer). — 75¢.
Both catalogs — \$1.00
☐ Plans for fabricating Struck Tractor (specify Magnatrac or Mini-Dozer) from local materials — \$7.00.
Both plans — \$10.00 (Refunded on any purchase).

**SEND
TO**

Mini-Dozer

LEARN PROFESSIONAL UPHOLSTERY
AT HOME! SPARE OR FULL TIME...

MEN & WOMEN ALL AGES! Send for free book on learning to reupholster chairs, divans, footstools, all furniture for **BIG MONEY** in spare or full time. No experience needed, no age or educational limits. We show you how and provide **EVERYTHING** needed to start: (1) Self-study program covering all phases. (2) All tools and 3 big furniture kits for practice. (3) ... all supplies, frames and materials to build \$300 worth of furniture, yours to keep or sell. Write for big, free opportunity book. No obligation, no salesman will call.

MODERN UPHOLSTERY INSTITUTE,
8128 Field Building, Kansas City, Missouri 64111

Learn ACCOUNTING at Home in Spare Time
2-YEAR COLLEGE DEGREE PROGRAM

Get free facts. No obligation. No salesman will call.

Thousands now studying for college degrees. Over 8½ million students enrolled in ICS since 1890. Fully accredited. Approved for G.I.'s and Veterans.

ICS Center for Degree Studies, Dept. PA041 g
ICS Accounting College Center, Scranton, PA 18515

SAVE MONEY

Assemble our Mansize DAHLCO Crawler Tractor Kit. Buy factory-direct. Catalog of Kit construction and uses -75¢. "Build-it-yourself" Plans - \$7.00 (refunded on any purchase).

DAHLCO
Dept. MI51
Cedarburg, WI 53012

FACTORY DIRECT!

go cart

New plans reveal step by step details on how to build your own Go Cart! NEW welded Go Cart frame kits! FREE coupons!

RUSH \$3 for plans & Giant Catalogue to:
Box 34304, Dept. MI-5, Omaha, Nebr. 681340010

MUSCLES? In 7 days

my method of **DYNAMIC-TENSION** starts giving results you can feel and your friends will notice. Big, useful muscles. Gain weight, if needed. Lose "pot belly." Send your name and address for 32-page book—FREE.

CHARLES ATLAS, 49 West 23rd St., New York, N.Y. 10010 Dept. 6E

MAKE MONEY! REPAIR HYDRAULIC JACKS

Earn while you learn at home. Millions of jacks in gas and auto service stations, trucking firms, body shops, riggers, factories and farms need servicing... most of which you can learn to repair. We show you HOW. Start spare time in your basement or garage. Big opportunity for mechanics.

ACT NOW!

Write for folder No. MI-5 and free bonus offer.

Hydraulic Jack Repair Manual Co., Inc.
P. O. Box 3 • Staten Island, N.Y. 10314

Print For Profit

Cards; stationery; envelopes; advertising; labels; tickets; QSL cards; announcements; greeting, sympathy, prayer cards; tags, etc. Save money. **Own a Printing Business.** We supply everything direct from factory. Easy instructions. Also raised printing like engraving. Have home shop. Add to income. Send 25¢ for catalog.

Kelsey Presses, 81-AE Meriden, CT 06450

PUMPS
Drain • Irrigate • Circulate • Spray

Heavy duty ball bearing pump. All metal, rust-proof Type XB. Stainless shaft. Use ¼ HP or larger. 1 HP 1,200 GPH 60" high or 3,000 GPH 25' well. 5,200 GPH max. 1¼" in; 1" out. Belt or direct drive. \$21.95

Type P won't rust or clog. Bronze bearing. To 2,400 GPH. 1" in; ¾" out. \$15.95

Add \$2 pstg. & hndng. **Money back Guarantee.**

LABAWCO, 5 Hwy 206, Belle Mead, N.J. 08502

Star View Systems

H&R COMMUNICATIONS, INC.

Route 3, Box 103G - Pocahontas, Arkansas 72455



Introduces the **MODEL 12K SYSTEM...**

A complete home satellite receiving system that you can assemble yourself as a week-end project.

Why spend \$7,000 to \$10,000. Why pay someone else to install it. Do it yourself in a week-end and save.

ONLY \$3,795.00
UPS SHIPPABLE

KIT CONTAINS

- 12' Antenna
- AZ/EL Mount
- 24 Channel Receiver
- 120° LNA
- Feed Horn
- All Miscellaneous Cable and Connectors Needed
- Everything You Need
- No Special Tools Needed
- Complete Antenna Weight Only 125 Pounds

See Your Local Star View Dealer or Call
800-643-0102 or 501-647-2291

DEALER INQUIRIES INVITED

50 Channels

MANUFACTURE THIS BEAUTIFUL CONCRETE OUTDOOR FIREPLACE

Right In Your Back Yard

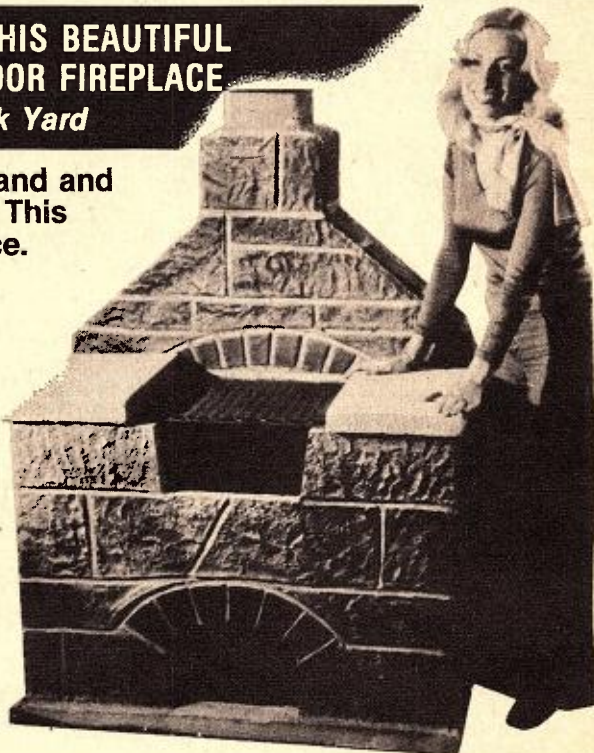
\$10.00 Worth of Sand and Cement Produces This Attractive Fireplace.

Sells on Sight from \$250 to \$300. Easy to start your own Profitable Business.

The RPT Mfg. Fireplace Molds and Process are the most amazing and foolproof ever invented. Simple to operate.

BIG DEMAND!!

Sell all you produce to Department Stores, Homeowners, Parks, Nurseries and Picnic Groves. Fireplaces sell on sight. No experience necessary. We supply full operating instructions and equipment plus the know-how that spells **BIG PROFITS**. This is an outstanding opportunity for men of vision and small capital to get in a busy rich paying field. Don't delay, Mail coupon at once for full details.



RPT MFG. DEPT. MI-15
3537 Limekiln Pike, Chalfont, PA 18914

Name _____
Address _____
City _____ State _____ Zip _____

Classified Ads

Reach over 6 million readers in MECHANIX ILLUSTRATED. Rates: \$4.75 per word, \$1.25 extra per word for **BOLD FACE**. Each insertion is payable in advance by check or money order, please. Minimum ad unit is 10 words. Please note the heading under which your ad is to appear. Copy for the July issue must be received by April 25th. Send to MECHANIX ILLUSTRATED, Attn: Clare Erlanger, 1515 Broadway, New York, N.Y. 10036, 212/975-7549. Word count: Zip Code Free. Figure one word; name of state (New Jersey); name of city (New York); sets of characters as in key (14-D), also abbreviations as 35mm., 8x10, D.C., A.C.

Complete product information and/or sample is required from new advertisers. Samples will be returned on request.

SAVE MONEY • ORDER BY MAIL

AUTOMOBILES & MIDGET CARS

MIRACLE CARBURETOR vaporizes Gas 100+ MPG. Drawings-Details \$10. Money Back Guarantee. Carbu, Route 1M, Hitchcock, South Dakota 57348

WATER INJECTOR-build easily, inexpensively!! Free details-SASE. U&I, Box 4873-M15, Boise, Idaho 83704

SECRETS OF THE 200 MPG CARBURETOR! Patent Drawings and Instructions \$11.25 Money Back Guarantee. RoadRunner Press Raymondville, TX 78580

SECRETS OF FANTASTIC MILEAGE!! - Details FREE - Avteck, Box 5202-E5, Rockford, Illinois 61125

INCREASE GAS MILEAGE - Up to 35% in tests! Patented! Details: Hollowell's, Box 503A, Southampton, Pa 18966

DEALERS-COST-QUOTE on new Cars. Become informed before buying and **SAVE**. Only \$8.00. List make, model, 10 options. Hairston's (M15) 245 College Drive, Bldg-6, Edison, New Jersey 08817

AUTOMOBILE RE-TUNING FOR MAXIMIZED ECONOMY. Simplified techniques increase MPG 50%+! **DETAILS FREE!!** Techneering, Box 12191MI, Norfolk, VA 23502, (804) 495-2033 (recording).

200 MPG, Fact or Fiction? Information free. Harte's, Hartford, MI 49057.

WATER INJECTOR PLANS How to make your own and get better gas mileage. Send \$5.00 to Randy Doodeman, Box 138, Cedar Lake, Indiana 46303

AUTO SUPPLIES & EQUIPMENT

ALTERNATOR GENERATOR Rebuilding Book. Details: Hedelund Engineering, 7505 Barkentine, Las Vegas, NV, 89128

MOTALOY RING, valve job while driving. Guaranteed \$9.99 postpaid two \$17.50. Andris, Box 34081, San Francisco, CA 94134

ANTIQUE FORD parts, restoration supplies. Catalog \$2.00. Mark, Layton, NJ 07851.

PREVENT THEFT! Total protection for ALL VEHICLES. Alarm Kit easily installed. **FULL 10 YEAR WARRANTY!** Only \$29.95 postpaid. **GUARANTEED!!** DEVIL DOG, Box 2616-M, Bismarck, ND 58502.

NEW INVENTION, 100 MPG conversion \$5.00. Homecraft, 2350 W47MX, Denver, CO 80211

SAVE GASOLINE!! Bypass Pollution devices—easily, reversibly!! Posco GX5, LaGrangeville, NY 12540

AUTO PARTS below wholesale. Send \$1.00 for catalog. Refundable. Capco Industries, RT8, RD2, Waterford, Penna 16441

BAD STARTER OR ALTERNATOR? Most U.S. auto starters or alternators rebuilt with warranty. Order now for quick service and save. Send your defective unit plus \$24.95 to Enginuity, Inc., Route 7, Box 606, Augusta, GA 30906

PREVENT CAR BREAKINS —simple, effective, easily installed. \$4.00. Money back if not satisfied. VMD Enterprises 16415 N.W. Brugger Road, Portland, Oregon 97229.

SAVE GAS - VAPOR JET - PATENTED - LAB TESTED - Mileage increase 17.3% verified - Increase horsepower - Eliminate ping, carbon buildup - Fits all cars, trucks, R.V.'s - Money Back Guarantee \$29.95 + \$3.00 post. Free Info. - N.E.S. Box 851 Ft. Morgan, Colo. 80701

FANTASTIC GAS SAVINGS at wholesale prices; 140 pages of proven products and information. \$2.95. TMSI, Box 4185MI, Hayward, CA 94540

SAVE MONEY! Tires, Custom Wheels, Auto Accessories-Buy Direct and Save. Send \$2.00 for Catalog. Tyres International, 619 E. Tallmadge Ave., Akron, Ohio 44310

AUTO CHANGE. Never fumble for coins again! Colorful plastic dispenser holds \$10 in coins. Backplate sticks to dash, console, or door. Removable dispenser fits in pocket. Red, blue, beige, black, or white. Improves highway safety. Satisfaction guaranteed. \$3.00 post paid. Andrea House, Box 40-D, E. Bridgewater, MA 02333.

HYDRAULIC JACK repair kits, parts and supplies. Catalog \$1.00. Hydraulic Jack Packing & Tool Co., Inc., General P.O. Box 3, Staten Island, N.Y. 10314.

STOP! FREE Details! Protect Life, Home, Auto, Van with quality Burglar Alarms! Reasonably Priced! GMC Box 702-I South Bend, Indiana 46624

MOTORCYCLES, BICYCLES, & SUPPLIES

MOTORCYCLE TOURING FAIRINGS 3 pce. kits, new "wrap around" saddle bags! Send \$1.00 for info. and photo. Stewart Fairings, 247 Clinton Rd. Freeport, Pa. 16229

AUTO TRAILERS & CAMPERS

CAMPER/TRAILER Kits - Plans - Fifth Wheels - Vans - Covers - Motorhomes - Simple construction - Save! Catalog \$1.00. GLEN-L R-V's, 9152MI, Roscrans, Bellflower, CA 90706.

ALTERNATE ENERGY

HOW TO INTEGRATE Homesite Energy \$2.00. AlEnSy, P.O. Box 707 Leander, Texas 78641

PROPANE/GASOLINE Dual-Fuel Conversion Manual \$5. Manufacturer Direct Kit \$295. PRO-POWER 1901 Morena Blvd., San Diego, Cal., 92110

ENERGY SAVING

GUARANTEED SAVINGS ON ELECTRIC BILL Year Round, using this proven system. Inexpensive modification required. Details \$4.00. Kraemer RT-3, Box 502B, Junction City, Oregon, 97448

SECRETS OF FANTASTIC MILEAGE!! - Details FREE! - Avteck, Box 5202-F5, Rockford, Illinois 61125

SAVE MONEY & Energy on your water heater. Plans, completely illustrated, \$4.00. J.V.F. Energy P.O. Box 14277 St. Louis, Missouri 63178

NEW SOLAR Dryer increases woodburning efficiency. Information and plans \$3. Required Reading Box 89 Culpeper, Virginia 22701.

SAVE ENERGY 101 WAYS. Practical ways to save energy everyday. \$2 plus SASE. SRS Associates, Box 223, Morris, MN 56267

BOOST COOLING EFFICIENCY WITH AUTOMATIC MIST CONDENSER COOLER. Save up to 40% Of cooling costs during the hottest weather. Overheating causes compressor overloading which wastes electricity and causes compressor failure. Easy owner installation. Complete Kit \$79.50. Haney Products, Lumpkin, Ga. 31815

GEOTHERMAL energy anywhere, details \$3.00 Plein, 1822 Xavier, Bismarck, ND, 58501.

HEAT SHIELD will make any outdated single wall wood stove into a modern efficient heater without any modification to your stove. Plans \$4.00, Heat Shield, Box 600, Wellington, Co. 80549

TOOLS, MACHINERY & SUPPLIES

LATHES - UNIMAT - Maximat - Sherline - Machinex. Catalog \$1.00 Shop Supplies \$1.00. Campbell's, 2100 Selma Road, Springfield, Ohio 45505

TOOLS AT Wholesale Prices. Free listing. Tool Division, WSC Inc., P.O. Box 394-MI, Wauseon, Ohio 43567

4" METAL Cutting Lathe \$76.25. Taig, 15048 Proctor, Industry, CA 91746

BROKEN TAP? Did a broken tap just turn your last project into scrap? Write us for recovery information. \$2. (for postage and printing, **DEDUCTABLE**) Electromation Research, dept. M15, Box 138, Clancy, Mt. 59634.

BUILD FULL SIZE METAL WORKING LATHE. USE SCRAP/JUNK. Free Information. Tennantville, Box 838MI, Northville, N.Y. 12134

MACHINIST'S WALL CHART. Just introduced. Makes all other reference charts obsolete. Combines U.S. threads with tapping and clearance drills, English threads, inch decimal equivalents and drill sizes, U.S. pipe threads, other useful data on 24x37 oil-resistant chart. Write for information. Chester River Machine Tool Company, Drawer 119C1, Chestertown, Maryland 21620.

SPACE ROCKETS & ASTRONAUTS

ANTIGRAVITY PROPULSION Device! Free Brochure, RDA, Box 873-N, Concord, NC 28025

AVIATION

PILOT PRETRAINING information \$4.95. Avoid ripoffs. GAPS, 1732, Easton, Md. 21601

HOVERCRAFT

ALL SEASON Hovercrafts. Plans, Catalog \$1.00. Cordova Hovercraft, Box 281, Cordova, Ill. 61242.

ENGINES, MOTORS & MAGNETS

SMALL ENGINES for Mowers, Tillers, Riders Hobby also Repair Manuals, parts, etc., tremendous savings. Illustrated Catalog \$1.00. Ashland Small Engines, Ashland, MO 65010

CB, RADIO-TV, HAM EQUIPMENT

CABLE TV DESCRAMBLERS and **CONVERTERS.** Build or buy. Plans and parts. For information send \$2.00. C&D Company, P.O. Box 21, Jenison, MI 49428

BOOST POWER? ADD CHANNELS? Boosters, antennas, kits, plans, repairs, modifications. **FREE CATALOG.** Panaxis, Box 130-E5, Paradise, CA 95969.

49¢ RADIO-TV TUBES. Free catalog. Cornell, 4215-M University Ave., San Diego, Calif. 92105

POLICE SCANNERS, Crystals, Radar Detectors. HPR Box 19224, Denver, CO 80219

LINEARS, SEND stamp for details, Matco Electronics, Box 316E, Cadillac, MI. 49601

RESTORE OLD RADIOS OR TV'S TO OPERATING CONDITION! Tired of searching for servicing information? Sams library of manufacturer's data for old radios dates to 1920. **PHOTOFACT®** 1981 Index lists available service data for over 110,000 TV's, Auto Radios, radios, CB's, and more. Send \$2.50 plus 50 cents shipping to Howard W. Sams Co., Dept. X0109, 4300 W. 62nd St., Indpls., IN 46268.

DECODER KIT UHF CHANNELS, Sine Wave Encoder System, Model 7 IIs. Complete Kit \$139.00 Plus 5% Shipping and Handling. Visa-Mastercharge OK. Also parts, etc., Catalog \$1.00. Simple Simon Electronic Kits, 11850 S. Hawthorne Blvd. Hawthorne, California 90250 TEL: (213)675-2335.

SUBSCRIPTION TV. Complete 2300MHz Micro-Wave Antenna System, fully guaranteed - \$279.95. Plans - \$9.95, refundable toward purchase of antenna. DynaComp Electronics, Dept. GF-3, POB 4181, Scottsdale, Az., 85258.

SCRAMBLED TELEVISION SECRETS! Manual includes theory, circuits, decoder dealers: \$14.95. Kits available. Information package: \$2.00. ABEX, P.O. Box 26601-MI, San Francisco, CA 94126

RECORDS & TAPES

OLD RADIO programs on cassettes. Free catalog. Nostalgic, Box 16365-MI, St. Louis, MO. 63125.

MAGIC TRICKS, JOKES & PUZZLES

FREE! WORLD'S-Leading Novelty Catalog. 1600 Jokes, Tricks, Science, Sports, Hobbies, Johnson-Smith, C-14, Mt. Clemens, Mich. 48043

CARD TRICKS Ten famous card tricks \$2.00. L. Annoni P. O. Box 2886 Allentown, Pa. 18001

FREE! MAGIC Book Brochure, D.S. Enterprises, MI-5, 62 Cedar Hill, Belleville, N.J. 07109

HYPNOTISM

FREE FASCINATING Hypnosis Information! Startling! DLM, Box 487, Anaheim, California 92805.

SLEEP-LEARNING — Hypnotism! Strange catalog free. Autosuggestions. Box 24-MM, Olympia, Washington 98507.

FREE HYPNOTISM Self-Hypnosis Sleep-learning Catalog! Drawer M-400, Ruidoso, New Mexico 88345.

FREE CATALOG! Self Hypnosis Tapes. Educational Systems, Box 580-M5 Cruigers, N.Y. 10521.

VENTRILOQUISM

VENTRILOQUISM PUPPETS! Catalog \$1.00 (Refundable), Maher, Box 420MV, Littleton, Colorado 80160.

DETECTIVES

DETECTIVE PROFESSION easy home study; free tie-tack or lapel pin, certificate, future. Professional Investigators Training School, Dept. CK, P.O. Box 1890, San Pedro, CA 90733.

MOTION PICTURES & SOUND EQUIPMENT

16MM FILM bargains. Videotapes. Specify. Send Stamp, Urbanski, 8142 S. Kenneth, Chicago, Illinois 60652

HOME MOVIES & COLOR SLIDES

FREE, HOME ENTERTAINMENT CATALOG. Hundreds of titles in video-cassette, super 8 or 16mm film. New releases from Paramount, Warner Bros, Columbia, MGM, Allied Artists, Disney and more. Specify film or video. Write: Niles, Box 1576-MI, South Bend, IN 46634.

HOME CRAFTSMAN

UNFINISHED PICTURE Frame Moulding, Factory close-out. 50% discount. 200 styles. Write: Japs, 126-MF Seventh North, Hopkins, Minnesota 55343

INCREASE BABY'S I.Q! Make stimulating toys, decorations designed by child developmentalist. (1 wk.-3 yrs.) For plans, send \$5.75: BWOL, Box 418, Billings, MT 59103.

OLD TIME wooden keyed lock. Full size patterns, instructions. \$4.00 Grandpa's, Box 434, Finland, Mo. 55603

PATTERNS! WOODEN Paddle Wheeler ... \$3.00! Circus Wagon ... \$3.00! Both ... \$5.00! Catalog \$1.00 (refundable). Anderson's, 6715M Chicago, Richfield, Mn. 55423

OVER 75 PATTERNS! Enjoy profitable, wooden gifts, toys, household accessories. **PLUS "ShopSecrets."** Only \$5.00. Accents (M-51), Box 262, Danvers, MA 01923

MAKE TOYS - Plans, Hardwood Wheels, Parts - Catalog \$1.00. Cherry Tree Toys, 2547 8th St., Berkeley, CA. 94710.

SPACESHIP MODEL PLANS for wood. Unique and beautiful: \$4.00. Box 252, Troy, Michigan 48099

UNIQUE TWO tire swing. Up to four children ride. Plans and photo send \$3.00. Box 922, Painesville, Ohio 44077

PROFITABLE SECOND INCOME. Make beautiful, small, utility bandsaw boxes from common lumber. High demand in gift and stationery stores, craft fairs. Illustrated instruction booklet for 10 proven original designs, \$6.00. Box-Art, Dept. A, Box 20, Clarendon Hills, IL 60514.

BEAUTIFUL WOODEN HANGING LAMP. Plans \$3.50. Lamp, 1608 Hayes, So. Beloit, Illinois 61080

"FREE" INDUSTRIAL Buyers Catalog for Home Craftsmen. BUY at same LOW prices as large Industrial Plants. Turnkey 36MA Letchworth Street, Buffalo, N.Y. 14213

PLASTICS

CASTOLITE LIQUID Plastics. Crystal clear, colors. For casting, embedding, coating, fiberglassing, in industry, laboratories, craft work. Reproduce your designs with our mold materials. Profitable. Illustrated Catalog \$1.00. CASTOLITE, Dept. 81E/MI, Box 391, Woodstock, IL 60098.

ARTS & CRAFTS

GROW YOUR OWN culinary delights-exotic mushrooms. Free instructions, recipes and dehydration procedures. Deluxe kit and only \$6.98 Anna's Gourmet Mushrooms, 230 1/2 Franklin, Waupun, Wis. 53983

MAKE FIGURINES, Plastercraft. Liquid Latex Rubber, Cement Lawn Ornaments, Plastic Molds. Sample & Catalog - \$1.00. Wooley Company, Box 1453, Peoria, Illinois 61655.

ORNAMENTAL DECORATION HAND-BOOK. Fun projects! Profitable careers! Free brochure. Normandy House, Desk M5, 4701 Normandy, Fort Worth, TX 76103.

CARTOONING SIGN PAINTING

SIGN PAINTING - Easy Method. Free catalogue. Kaufmann Signs, Centertown, Missouri 65023

CARTOONING TAUGHT by mail. Free brochure. Write Cartoonorama, Box 263-OR, Branford, Ct. 06405

CARTOON FOR Fun and Money!!! Free booklet!! Cartoons, Box 40614C, Detroit, Michigan 48240

LEARN CARTOONING. Free brochure. Write: Cartooning, Box 7069MI Colorado Springs, Colorado 80933

35 LESSON Cartooning Course, Markets Both \$5.00. Tooners, Box 30367, Lincoln, Nebraska 68503

STAINED GLASS

"GETTING STARTED IN Stained Glass" 50¢. Whittenmore, Box 2065L, Hanover, MA 02339

DO-IT-YOURSELF

SPEAKER SYSTEMS AT HALF PRICE Info, write Jack Fisher (2-B) Box 522174, Miami, FL 33152

FENCE, BUILD yourself. SAVE. Complete illustrated instructions. Simple, easy to follow. Many styles. sources for material, etc. Specify wood or chain link. \$5.00. Hanco, Box 131, Rowlett, TX. 75088

SAVE YOURSELF and your property from burglaries. Info, write Jack Fisher (2-B), Box 522174, Miami, FL 33152

GENERATE HYDROGEN Fuel!!! Plans for generator and automobile conversion. Parts list/sources. Only \$10.00 RDA, Box 873, Concord, NC 28025

PROPANE/GASOLINE DUAL-FUEL AUTO! Easy conversion plans and parts list. Only \$10.00! RDA, Box 873, Concord, NC 28025

POWERFUL REVERSIBLE 12 VOLT MOTOR for Winch using automobile starter, Details \$2.00. Motors ME, Box 28, Perry, Fla. 32347

TEXTURE CEILINGS: Easy steps to learn to texture your own ceilings, or texture professionally. You can earn up to \$50.00 an hr. - Send \$3.00 to Texture Ceilings c/o L&L Drywall Box 311 Newark, Ohio 43055

NOW! YOU can repair your lawnmower yourself! Details-Repairs Unlimited Box 30-MIMA Commack, New York, 11725

SAVE \$ Superior window cleaner 20¢/qt. Easy formula \$1.00 and SASE. Enterprise, Box 1189, Georgetown, S.C. 29440

TWO BRAND NEW HARD COVER BOOKS FROM DeWALT. Ideas, tips, techniques, how-to: hundreds of photos and drawings: The Magic of Your Table Saw (288 pages) and The Magic of Your Radial Arm Saw (310 pages). \$8.95 each. Specify which book. Send check or money order to DeWalt, Dept. CM, 715 Fountain Ave., Lancaster, PA 17601

HOW-TO - Built-in Bookcases Step-by-step guide send \$5.00 to Bookcases, Box 7285, Greensboro, N.C. 27407

BUILD A fake fireplace, \$200. C Vance, 6235 Wisconsin, Hobart, In 46342.

1400 CATALOGS listed and described. Sources for everything imaginable. \$4.00. Masterlog, Box 879-D, Fairfax, CA 94930.

BUILD CENTRAL AIRCONDITIONING into your furnace - approx. \$90.00 Materials - low operating costs using water - layout & instructions - Send \$3.00 to T. Hazlett, Box 56, Stroud, Ontario, Canada, L0L 2M0

"GOKART" "KITS" from "\$89.50". INFORMATION and 4 color decal \$1.50. Forton Mfg. Company, 71A Mastic Blvd., Mastic, New York 11950

AFFORDABLE GREENHOUSES: 8'X13' greenhouse for under \$60.00. Easy building instructions only \$3.95. Catalog \$1.00. Alternate Ventures, P.O. 380, Magna, Utah, 84044.

CLEAN YOUR OWN CHIMNEY! Complete 24 page illustrated instructions by professional sweeps. \$10 Rocky Ridge, Box 245, Sugar creek, Ohio 44681

SATELLITE TELEVISION! Receive 80 channels! Secrets... \$1. Meier, Maple St.-M, Charlevoix, Michigan 49720

BECOME YOUR OWN HOME BUILDER Start with our complete guide to contracting your own home. Includes information on government regulations, blueprints, and financing. Also a Master Budgeting form and a step-by-step checklist presently in use by licensed building contractors. Send \$3.25 to SGS Enterprises, Box 121, Valley Center, KS. 67147

PROJECTION TV... Convert your TV to project 7 Foot picture... Results equal to \$2,500 projector... Total cost Less than \$20.00... PLANS & LENS \$16.00... Illustrated information FREE... Macrocomdi, Washington Crossing, Pennsylvania 18977. MC/Visa - 215-736-3979

MODELS: SHIPS, CARS, PLANES, ROCKETS

RADIO CONTROL-Airplanes, Boats, Helicopters, Systems, Supplies, Big Discount Catalog-\$4.00 (Refundable). Modelers Supply, Box 7185, Montgomery, AL 36106

RADIO CONTROL DISCOUNT CATALOG \$1.75 (Refundable). D&G Hobbies, 6029 Broadmoor, Box 542, Shawnee Mission, Kansas 66201

FISHING TACKLE & LURES

PLASTIC WORMS make your own. Molds, supplies, tackle. Send 50¢ catalog. Super-Sport 422 N. Varney St. Burbank, Calif. 91502

SPORTING GOODS & ATHLETIC EQUIPMENT

GYM EQUIPMENT PLANS - 100 plans. \$2.00 each. Professional, easily built, metal gym equipment. Catalog \$1.00. Miller, Box 1234, Ft. Lauderdale, Fla. 33302

BODY BUILDING, SELF- DEFENSE COURSES

KARATE HOME STUDY COURSE Learn Oriental fighting secrets quickly and easily. Certificate awarded. Free brochure. New Orient Karate School, Dept. N211, P.O. Box 5, Avon, N.J. 07717

BOATS, INBOARD & OUTBOARD MOTORS

BOAT PLANS - FRAME KITS - PATTERNS - Powerboats - Sailboats - Outboards - Canoes - Kayaks - Rowboats - Duckboats - Houseboats - Runabouts - Dories - Workboats - Fishing Boats - 8' to 49' - Construct In - Plywood - Cold Molded - Wood/Epoxy - Fiberglass - Steel. Lowest cost, highest quality! Easy, proven methods include instructions especially for amateurs. No lofting! SUPPLIES - Fastenings - Fiberglass - Resins - Glues - Spars - Books - Trailer Plans. HUGG 144-page catalog - \$2.00 - Includes FREE "BOATBUILDING SUPPLIES" brochure. GLEN-L Marine, 9152 Rosecrans, Dept. IM, Bellflower, CA 90606.

BOATKITS-PLANS-PATTERNS-FRAME-PACS-FIBERGLASS MATERIALS - World's largest catalog-300 Designs-8'/80'-Plywood-Fiberglass-Steel-power-boats-Inboards-Outboards-Cruisers - Sportfishers - Hydroplanes - Runabouts - (KAYAKS CANOES Large Selection) - SAILBOATS - Daysailers - Trailersailers-Multihulls-Motor Sailers-FIBERGLASS Cloth-Resins-Foam-C-Flex-CATALOG\$2.00. "Includes FREE Materials Brochure-Hardware-Pastenings-Equipment-Rigging-Sails-Glue-Etc." (Book) - "AMATEUR BOAT-BUILDING" - In Fiberglass-Plywood-Epoxy/Wood Saturation Technique-\$6.00) CLARKRAFT-161 Aqua Lane, Tonawanda, NY 14150

BOAT KITS - 27 trailerable models - POWER and SAIL - 11'-30'. Molded fiberglass hulls and decks come factory assembled - you install factory supplied interior. Save half factory-built cost. No experience required. FREE 48-page catalog. Luger, Dept. DC-81, 3800 West Highway 13, Burnsville, Minnesota 55337 612-890-3000

FLUSH MOTOR... coat cooling system... prevent corrosion... Free info... Flushette, 11727 Sheridan, Houston, TX 77050

EVINRUDE 1980 BARGAINS... all sizes... \$1.00 handling... Scott McCulloch parts... Electra Marine, 610 Merrick Road, Lynbrook, New York 11563

HOBBIES & COLLECTIONS

COLLECTING MILITARY Medals? List 50¢. Vernon, Box 887MI, Baldwin, NY 11510

GROW AND COLLECT GIANT Crystals! Free brochures. Crystocraft Company, 10322 Schnapf Lane, Newburgh, Indiana 47630

BEER CANS, list free, established dealer. Williams, 181 Meadow Drive, Elyria, Ohio 44035.

STAMP COLLECTING

FREE!!! BEAUTIFUL stamps Gold, silver, others. Approvals, Delor, 21127 Fleetwood, Harper Woods, Michigan 48225

UNITED NATIONS 3 Complete Mint Sets 25¢, Approvals, Cornetta, POB 1509-I, Lake Placid, Florida 33852

FREE SURPRISE Collection with approval requests. World. 1784 Union, San Francisco, 94123.

PLATE BLOCKS one each 3¢, 4¢, 5¢, only \$1.00. Bryson, Box 8123M, Toledo, Ohio 43605

OLD U.S. Stamps on approval. Chester, Box 15355J, Phila., PA 19111

50 DIFFERENT old U.S. between 1861 and 1939 \$1.00. Ed Roush, 423 Shephard, Mansfield, Ohio 44907

ONE! TWO! Three! cent stamp approvals. Regardless Catalog, C. Kloster, 4164 52-St., San Diego, CA 92105

FREE: 32 Page United States Price List. Bedrin, 520M N.W. 165th. St. Rd. Miami, Fla. 33169

2,000,000 STAMPS * 150 countries * 2¢ each. Belden, Box 4149, Dearborn, 48126

FREE WORLDWIDE Packet. Penny approvals. Froelich, Box 412-C, Morton Grove, IL 60053

500 LITHUANIA, Estonia, Latvia, Ukraine, Five Dollars. Balts, 173 Linden, Middletown, New York 10940

TONGA, HEART, 29 other Topicals. 25¢. Approvals, Boylston Trading, Dept. MIT, #529; 739 Boylston Street, Boston, Ma. 02116.

FREE! 55 Different, including Triangles, Space, Others! Request Approvals. Baird, MI-34, Box 8128, Portland, Oregon 97207

FREE! BIG Bargain Catalog - New Edition listing thousands of bargains including U.S. & B.N.A. stamps, packets, albums, accessories and supplies. Also, fine stamps from our approval service, buy any or none, return promptly, please. Jamestown Stamp, Dept. E51MI, Jamestown, NY 14701.

GENERAL APPROVALS - new customers - 100 world - 20¢. Kemco(M), Box 531, Wetsumpka, AL 36092

U.S. 30 different mint commemoratives \$1.00! 150 used commemoratives \$1.00! Approvals. Gordon Davison, Contocook, New Hamp. 03229

ANTIQUES, RELICS, INDIAN GOODS & CURIOS

INDIAN ARTIFACTS Arrowheads \$6.00 List 25¢ C. Secrist, Deerfield, Mo. 64741

EDUCATION & INSTRUCTION

BRITISH DEGREES in Management, Economics, Philosophy, Psychology and others. By extension study or experience or credits. Prospectus Airmailed \$2.00. Sussex College of Technology, Highfield Danehill, Sussex, England RH11 7EX. Founded 1969.

INSTANT MEMORY... NEW WAY TO REMEMBER. No memorization. Release "photographic" memory. Forget nothing! Liberates. extraordinary knowledge, talent, ESP. Immediate results! Free information. Institute of Advanced Thinking, 845MX ViaLapaz, Pacific Palisades, California 90272.

WATCH AND CLOCK REPAIR books. Free catalog. North American, Box 77-CEA, Fox River Grove, Illinois 60021.

COLLEGE DEGREES BY MAIL. Get Bachelors, Masters, Ph.D.s... the easy way, at low cost without attending any classes at all! Free revealing details. Counseling, Box 389-MIS, Tustin, California 92680.

HIGH SCHOOL DIPLOMA AT HOME FAST! Diploma in just 1-6 months! Tests taken at home. Low tuition/Only \$49 down. Nationally recognized. Individual counseling. Free school ring. Call Free 1-800-327-8103. Cambridge Academy (MI-5), 409 E. Osceola, Stuart, FL 33494.

HIGH SCHOOL at home, no classes. Diploma awarded, low cost. information FREE, call toll free anytime 1-800-621-5809 (Illinois 800-972-5858) or write American School, Dept. 30544 850 E. 58th St., Chicago, IL 60637. Give last year High School completed.

ELECTRICIAN. LEARN at home in spare time with no previous experience. Installation, maintenance, construction, lighting, heating, air conditioning applications. Get free facts. Write ICS Electrician School, Dept. PAC41, Scranton, Pennsylvania 18515.

COLLEGE DEGREES! Over 150 faculty members nationwide. Bachelor's, Master's and Doctoral Degree Programs. Independent home study/private telephone tutoring. Credits awarded for work/life experience. Accredited by National Accreditation Assn. Free academic evaluation. TOLL-FREE 1-800-327-7006. North American University (MI-5), 1277 E. Missouri St., Phoenix, AZ 85014.

LEARN HOUSE WIRING, do own professional repairs and installations, FREE FACTS. Lindy Publications, Box 8295, Dept. 0181 Chattanooga, TN 37411

LEARN BOOKKEEPING - CHANGE your life with a new exciting career. Low Cost Tuition. Send for Free career packet. American Career Institute, Dept. ON117, 412 S. Lyon St. Santa Ana, CA. 92701

COLLEGE DEGREES BY SPECIAL EVALUATION OF EXISTING Credentials & Job Experience. Fast, inexpensive, (614) 863-1791. Guidance, Box 13151-15, Columbus, Ohio 43213.

BOOKS, PERIODICALS, NEWSPAPERS

FREE BOOK. Prophet Elijah Coming Before Christ. Megiddo Mission, Dept. 65, 481 Thurston Road, Rochester, N.Y. 14619.

MAKE CONFIDENT DECISIONS in your investments, career and personal life! Clear, efficient methods taught step-by-step in a new book: How to Make Decisions Creatively. Three week moneyback guarantee. \$8.95: Hartnell Publications, Dept. A, P.O. Box 255868, Sacramento, CA. 95825.

MUSICAL INSTRUMENTS

EASY PLAY & Make, quality dulcimers, banjos, hammered dulcimers, instruments and kits from \$35. Brochure. **HERE, INC.** #X, 29 SE Main St., Minneapolis, Minnesota 55414

ACCORDIONS TOP Brands Cordovox tremendous discounts, Trades accepted. Free brochure. MI Accordion-O Rama 16 W 19th Street, N.Y.C., N.Y. 10011.

SUPER SAVINGS. Guitar Strings, Accessories, Effects Pedals, Microphones, etc. Free Catalog. Super-Save Music MI, Box 944, Morganton, N.C. 28655.

AGENTS WANTED

SPARE TIME CASH. Sell famous Hanover Shoes. Samples, sales kit free. No experience needed. No age limit. Big commissions. Hanover Shoe, Dept. 2986, Hanover, Pa. 17331.

EARN IMMEDIATE cash selling Mason Shoes to neighbors, friends, relatives. No investment or experience needed. Write for a free selling kit. Mason Shoes, K-573, Chippewa Falls, WI 54729.

TURN SPARE TIME INTO BIG EARNINGS without investment! Hundreds of National Companies seek men and women for part-time, spare-time, weekend work. Their offers are detailed in 5 issues of Opportunity Magazine and they're yours free! Write OPPORTUNITY, Dept. 596, 6 N. Michigan, Chicago 60602

SALESMEN- DISTRIBUTORS WANTED

SELL SENSATIONAL LOW-COST PRE-ENTRY PROTECTOR FOR AUTOMOBILES, HOMES, ETC. Distributors wanted. Exceptional margin. Samples for trial. Northwest Electric, Ave. 185, Mitchell, SD 57301.

BIG MONEY IN BUSINESS PRINTING! 25% COMMISSION PLUS BIGGEST CASH BONUS! Build your own profitable year around business. Show tremendous line of salesbooks, register forms, unit sets, letterheads, envelopes, invoices, statements, business cards and dozens of other printed products. Lowest prices in industry. Something for every business and professional person. Free sales kit includes ad specialties, calendars, signs and ad matches. No experience needed. Our catalogs are easy to understand. We're over 50 but still young and aggressive, so we can show you the road to a very profitable full or part time career. Free sales kit. National Press, Dept. 146, North Chicago, IL 60064.

BUSINESS OPPORTUNITIES

LEARN SEWING Machine Repairing. Men, Women. Lucrative profits. Gresslin Correspondence School, Box 927, Spencer, Iowa 51301.

\$92.00 From Square Foot Plywood (Huge Demand). Revealing report 25¢. (Refundable). Woodex, Bridgewater, Mass 02324.

MAKE \$2,000 Monthly. Spare time, Unique proven enterprise. No selling no capital to start. Free brochure. Kashbuilder, Box 1122-M, Indianapolis, Ind. 46206.

WOODWORKERS - IDEAL Home Business. Free Brochure! Fine Shop, 78M, West Peterborough, NH 03466

LEARN THE Secrets of Repairing Junk Batteries. "FABULOUS PROFITS". Apex Engineering, 5454 Bolsa, Atascadero, Calif. 93422

SHARE IN THE MILLIONS being made in **COMPUTERS.** Starting report \$1.00. Authoritative new book \$20.00. SeaBird Press, Box 1127 Gloucester, MA 01930.

OPPORTUNITY FOR Profitable Solar Heat dealership. Write for details. Sunpower, 6612 West 47th, Sioux Falls, South Dakota 57106

DEBTS WIPED OUT with secret Federal Law! Fortune-building **FREE REPORT!!** Blueprints X5, LaGrangeville, NY 12540

MAKE MONEY Printing business cards, pencils, matches in Gold, Easy, Details: POB 24986 (DC), Tampa, FL 33623

NEW TAX Loopholes discovered. Everyone eligible. Free Sample Newsletter. Write ULC, Box 179-CM, Clarkston, Ga. 30021

MONEY - MAKING Bumpersticker Printer. Easy, Free Details. POB 22791 (DC), Tampa, FL 33622

BECOME REAL ESTATE Inspector - \$100.00 Hourly potential. Be Boss, Part/Full Time. Home Operation Eliminates Investment. Simplified Instruction, Forms, Assistance, Free Information. Box 418MI, Sullivan, MO 63080.

BELT AND Buckles, complete line fast sellers including trucks, motorcycles, CB's, westerns etc. Big Profits. Complete dealer set up. Free catalog. Anchor, Box 3958-BMI, North Providence, RI 02911

VENDING MACHINES. No selling. Routes earn amazing profits. Big catalogue **FREE.** Parkway Corporation, 1930 MIB Greenspring Drive, Timonium, Maryland 21093.

PIANO TUNING quickly learned with home study courses. Diploma granted. American Tuning School, 17050 Telfer Dr., Morgan Hill, Calif. 95037.

SUCCESS FOR YOU Raise Fishworms and Crickets **FREE LITERATURE.** Carter Farm 60, Plains, Georgia 31780

\$500-\$1000 Month plan raising rabbits for us. Free details. White's Rabbitry-MI, Hudson, Ohio 44236

REPAIR HYDRAULIC JACKS—DETAILS FREE. WRITE HYDRAULIC PARTS SUPPLY, BOX 4157, BROWNSVILLE, TEXAS 77820.

WOODWORKERS—START profitable business making unusual gifts, decorative novelties. Easy!!! Everything explained!!! Free details. Williams, 32L Titus, Glen Cove, NY 11542

GET RICH!! Secret law smashes debts—brings cash and credit! Details **FREE!!** WealthKit-X, Billings, NY 12510

TAKE CATALOG Orders. We dropship 2500 best-selling specialty products. Lowest below wholesale prices. Immediate delivery. Spectacular home business opportunity **FREE BOOK.** SMC, 6061 De Soto Ave., Dept. 27-05, Woodland Hills, CA 91365.

FREE MAIL Order Dropship Business Journal! Mailer's World, Box 1355-R, Sioux Falls, South Dakota 57101.

MECHANICALLY INCLINED Individuals desiring Financial Independence operating Small Manufacturing Business without investment. Write: Businesses, 92H-5 Brighton 11th, Brooklyn, New York 11235.

VINYL'S WHERE the money is! Professionally repair, refinish, recolor furniture, luggage, car tops. Quick, easy. Two small \$200 jobs a day earn you \$1,000 a month. Homes, cars, offices, restaurants, unlimited customers. Start earning after a few days practice. Sensational details Free. VIP, 2008 Montrose, Chicago 60618.

UNLIMITED INCOME selling Quality Gift Items, Jewelry. (RETAILERS BUY DIRECT!) Wholesale catalog—\$3.00 (Refundable). Wilcoxon Enterprises, 784 Shard, MI-4, Fremont, CA 94538

PREPARE TAX Returns—Policeman Albert Myers made \$2,000 his very first season. Train at home. VA approved. National Tax School, Monsey, 5EN, N.Y. 10952.

PIANO TUNING learned quickly at home! Free information. Empire School, Box 1014, Jupiter, Florida 33458

MAILORDER COURSE Free. Secrets starting home mailorder import business. Mellinger, Dept. M2755, Woodland Hills, CA 91367

CLIP NEWSPAPER Items for \$2.00 to \$25.00 each. No Investment. Free details. Cardinal Publishing, Box 5200-C35, Jacksonville, Florida 32207.

MAILORDER OPPORTUNITY! Start profitable home business without experience or capital. Information free. Gil Turk, Dept. 729, Montvale, NJ 07645.

FREE CATALOG. Mailorder Bookselling. Write James, Box 1015-MI, National City, CA 92050

RARE OPPORTUNITY FOR FOUNDING SPONSORS! Former Shaklee President heads new organization. Free information. Enhance, Box 552-A, Fort Payne, Alabama 35967.

HUGE DEMAND AND PROFITS IN AUTO POLYSHIELDING. For COMPLETE business information kit send \$19.95 to Clean & Gleam, P.O. Box 15095, Plantation, Florida 33318 Phone 305-472-3773

IMPORT/EXPORT - Fantastic New Way To Start Profitable Business. No Investment. World Traders Digest/Directory of Foreign Suppliers. \$2.00 postpaid. Edd's Warehouse, Dept. MX5, 1506 First, Lake Charles, LA 70601.

BIG PROFITS!!! Reconditioning Discarded Batteries. Manual \$5.95. Everlast, Box 365, Bogota, N.J. 07603

BE YOUR OWN BOSS If you are ambitious and self motivated, we'll show you how to be a manufacturer of proven products for Homes, Schools, Factories and Chemical Plants. With out guidance and formulations you can succeed. For particulars send \$9.00 check or money order to **ADELPHIA RESEARCH & DEVELOPMENT CORP. MAIN ST., BOX 8, ADELPHIA, NEW JERSEY 07710**

AUTO INTERIOR CUSTOMIZING AND UPHOLSTERING are today's high demand skills - yet easily learned at home! Fabulous profit potential. Send for **FREE Opportunity Kit**, details. Auto Upholstery Institute, 412 S. Lyon St., Dept. ON117, Santa Ana, CA 92701.

EXPORT, IMPORT Mail Order, Sales Free Report. International, P.O. Box 522102, DMI-1, Miami, FL 33152

INCREDIBLE FUEL SAVINGS BREAKTHROUGH by automotive engineer can earn you \$300.00+ weekends! No investment! **FREE Dealership!** Almquist, XL5E, Milford, PA 18337.

FINANCIAL FREEDOM! Easy, exciting. Details Free. SASE. Powell, Dept. M, P.O. Box 310, Mansfield, PA. 16933

IGNORE THIS AD and miss the best money-making project available. New. Simple action, lightning-fast profit. No tricks; you'll see. Free details, profit: Ephany, Box 548, Woodville, Texas 75799

TIPS FOR INVESTORS AND ENTREPRENEURS and Source of Help for mail order beginners. Send \$6.00 to Steve Sigwarth, P.O. Box 191, Hiawatha, Iowa 52233

BATTERY REBUILDING, reconditioning. Molds, tools, instructions, Arrid Engineering, Box 4062, Mesa, Ariz. 85202

FREE! PROOF I made \$265,000 yearly with classified ads. Write: Moneycraft, MI-5, P.O. Box 845, Ceres, CA 95307

I HAVE MADE A FORTUNE IN MAIL-ORDER, selling information! Let me show you how. **FREE** proof. Mailorder Information Services, 2385 Roscomare, D-11/165, Los Angeles, California 90024.

MONEY SECRETS Help people and businesses get money. Easy home business. Fantastic profits. No experience - own hours. Continuous assistance. Free Details: DFC, Dept. 12-G-5, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

DISTRIBUTORS, IMMEDIATE Cash Profits. Revolutionary Automotive Bargain. Free Details, Motaloy, Box 4457E5, Downey, CA. 90241

PROJECTION TV . . . Make \$200.00 + per evening assembling Projectors . . . Easy . . . Results equal to \$2,500 projectors . . . Your total cash less than \$15.00 . . . **PLANS, LENS & Dealer's** information \$14.00 . . . Illustrated information **FREE . . .** Macrocom-dix, Washington Crossing, Pennsylvania 18977

PLASTERCRAFT! MONEYMAKING home business. Details. Mailway, 24949FF5, Nashville, Tn. 37202

SELLING KNAPP SHOES IS EASY. Highest cash commissions immediately. Enjoy a steady income with satisfied repeat customers. Your own hours. No investment. Free selling and training kit to qualified applicants. Write John Learnard Knapp Shoes, 5099 Knapp Centre, Brockton, MA 02401

SHORTCUT TO BIG PROFITS! True facts of 1,000 moneymaking offers revealed. Globe, Box 20588-M5, St. Louis, Missouri 63139.

MAKE RUBBER Stamps for profit. Inexpensive machine. Very easy. Free Details. POB 22809 (DC), Tampa, FL 33622.

BABY SHOES. Bronze, Porcelanize. Big Money home business! Inexpensive kits, company assistance. Metalcraft 03E5, East Providence, RI 02914

26 UNUSUAL Ways Mechanically Inclined People Make **EXTRA CASH!** Free Details. Write: Entrepreneur, 2311 Pontius Ave., Suite E612 L.A., Calif. 90064

HOME BUSINESS, Profitable Manufacturing Detergents, Polishes, Cleaners, Specialty Products. Complete Formulas! Chemical Specialties 03C5 East Providence, RI 02914

MAIL LOCK BOXES! DIRECT FROM MANUFACTURER. America's mailbox shortage has created a strong demand for private mailbox rentals. Now you can prosper in your own **PRIVATE MAILBOX SERVICE.** This low investment/high profit business requires no experience and is considered one of the hottest new opportunities in the Country today. We are a 46 year old company that provides the boxes, design assistance and marketing aids. Our complete start-up program is free of charge with purchase. Not a franchise, no fees ever. Call collect or write today for free information. **SALSBURY INDUSTRIES,** 1010 East 62nd Street, Los Angeles, Ca. 90001. (213) 232-6181

FREE Book, "2042 Unique Proven Enterprises." Fabulous "unknowns," second inflation income. Haylings, Carlsbad, CA 92008.

MONEYMAKING OPPORTUNITIES

MAKE \$30 HOUR at home sandblasting designs in glass. Free Details. Write: Etching, Box 445-D, Strathmore, CA 93267

NEW DISCOVERY in battery reconditioning. Eighteen month guarantee means "Big Profits Fast." Electron, 7415 Gable Drive Little Rock, AR 72205

\$175.00 WEEKLY correcting pupils' lessons! Samples, \$1.00! Castle's, 507-ML, Fifth, New York City 10017.

\$100 EASILY EVERY TWO WEEKS! Mail Order type work! Pay check issued monthly. Free details. Promotions, Box 316-M, Irvington, N.J. 07111

PLASTERCRAFT ! ! ! PROFITABLE home business. Molds Available. Details; Lynnette, 6251P, Mentor Park, Mentor, Ohio 44060.

SPARE TIME CASH. Sell famous Hanover Shoes, Samples, sales kit free. No experience needed. No age limit. Big commissions. Hanover Shoe, Dept. 2987, Hanover, Pa. 17331

"CANADIAN MILLIONS in mail. Instant money info: Write Millions, Dept. MI, Box 6722, Station A, Toronto, Ontario Canada, M5W 1X5

\$500.00 WEEKLY mailing books for corporations from home! (Start Immediately!) Details—Tribune MI-5c, Box 18553, Wichita, KS 67218

42 UNIQUE easy moneymaking ideas explained \$3.00 check or M.O. to Connors, Box 162MI, Agincourt Ontario M1S 3B6

WHO ELSE wants to **MAKE MONEY** on Government Surplus? Details \$2.00. Carroll, 2236 Hoyt S.E., Salem, Ore. 97302.

SILVER FOR pennies per ounce. Details: Rae's P.O. Box 182M, Walla Walla, Wash. 99362

FREE! MONEYMAKING mailorder report. Cooke Limited, 58-1 Madsen, Beaconsfield, Que. H9W 477.

END ALL Money Worries! Easy. Learn how. Free Details. Beverly, Box L-MI, Devine, TX 78016

\$300 WEEKLY! Spare Time, Mailing Salesletters. Details: Delta, Box 2902-CRS, Rock Hill SC 29730

WIN AT Dice! 582 to 1 odds your favor! Free Proof. Baker, Box 196A, Brooklyn, New York 11218

MONEY MAKING opportunities . . . up to \$250.00/week!! Work part time only. Free info. Central Mail 3308 Midway #191 San Diego CA. 92110

PROFITABLE OCCUPATIONS

REPAIR LAWNMOWERS wholesale list 35¢. No stamps. Ellwanger, 15 Canal, Port Jervis, N.Y. 12771

MECHANICALLY INCLINED INDIVIDUALS Assemble electronic devices in your home. Knowledge or experience not necessary. Get started in spare time. Above average profits. \$300-\$600/wk. possible. Sales handled by others. NO investment - Write for free details. **ELECTRONIC DEVELOPMENT LAB,** Box 1560MI, Pinellas Park, FL 33565

FREE CATALOGS. Repair air conditioning refrigeration. Tools, supplies, full instructions. Doolin, 2016 Canton, Dallas, Texas 75201.

BAKE NEW greaseless doughnuts in kitchen. Sell stores. Free recipes, Jennifer Ray, Waseca, Minn. 56093.

TECHNICAL WRITERS make big money! Free details: TEK PUBS, Box 4778-X, Santa Clara, CA 95054.

LEARN CLOCK REPAIR! Comprehensive Home Study Course. Approved Commissioner New Jersey. Personal, Professional guidance. Details: School Clock Repair, 7 Cambridge Court Rm. R Toms River, New Jersey 08753.

BARGAINS, WHOLESALE

CLOSEOUTS! DISCOUNTS! Below Wholesale! Freebies! Samples! DDN, Box 20152-X, Ferndale, Michigan 48220

SAVE ON PARTS! Free catalog jammed with Motorcycle, Snowmobile, Small engine parts, Accessories, Manufacturer's Supply, Box 157-M15, Dorchester, WI 54425

RINGS, JEWELRY priced 130% below retail price. Catalog \$1.00 (refundable). Anka-HX 95 Washington, West Warwick, RI 02893

400,000 **BARGAINS** Below Wholesale. Many Free. Liquidations . . . Closeouts . . . Job Lots . . . Single Samples. Free Details. Bargainhunters Opportunities, Box 730-E, Holland, Michigan 49423.

REPAIR PARTS for chainsaws, lawnmowers and small engines combine top quality and low prices. Service tools for shop use. Guaranteed. **FREE CATALOG.** For special dealer information also give sales tax No. Repair Parts Dept. 23801 Box 6329 Erie PA 16512.

WORLDWIDE BARGAINS: Imports . . . Dropship . . . Freebies . . . Marnees, Box 1717-MI, Highland, Indiana 46322

CARPET. SAVE 30 to 60%. Contact DANYCO, P.O. Box 636, Lake Junaluska, N.C. 28745. (704) 627-9431.

FIREWORKS - OVER 100 items top quality, lowest prices; Catalogue \$1.00; Pyro-Sonic Devices Corp, Box 711-MI; Grand Haven, MI 49417. Offer void where prohibited by law.

EXPORT-IMPORT

"2500 FAST-SELLERS". Free Brochures! Brightco, Box 91309-M5, Cleveland, Ohio 44101

OF INTEREST TO ALL

TEN RULES FOR HAPPY MARRIAGE. Beautiful 8x10" certificate suitable for framing. Send \$2.00 today to: Pacesetter, Drawer 94086, Oklahoma City, OK. 73143.

HOW TO Make a Fortune in Sales \$5.00 to: Allred, 1306 E. 109th St., Kansas City, MO. 64131

NOW POWERFUL financial tool Knowing Where Your At Today \$9.95 Moneyback Guarantee Kace Report 10, Dept. 1101, 105E Pony, St. Paul, MN 55124

NUCLEAR WAR Survival Book \$6.00. Thousands already gone. Fornss, Box: 545, Newport, VT. 05855

GOVERNMENT SURPLUS

"GOVERNMENT SURPLUS DIRECTORY." Buy 500,000 items (including Jeeps) . . . low as 2¢ on dollar! Most complete information available \$2.00 guaranteed). **SURPLUS DISPOSAL**, Box 19107-CE, WASHINGTON, DC 20036

JEEPS-\$19.301 - CARS-\$13.501 - 650,000 ITEMS! GOVERNMENT SURPLUS - MOST COMPREHENSIVE DIRECTORY AVAILABLE TELLS HOW, WHERE TO BUY - YOUR AREA - \$2. - MONEYBACK GUARANTEE - "GOVERNMENT INFORMATION SERVICES," DEPARTMENT C-5, BOX 99249, SAN FRANCISCO, CALIFORNIA 94109

JEEPS . . . \$18.88!! . . . 675,000 Items! Buy in Your Area! How! Where! . . . Moneyback GUARANTEED 1981 Government SURPLUS Directory! . . . Including "Buy G-LANDS," . . . "G-Oil/G-Gas LOTTERIES," . . . \$2.00. **GSURPLUS, Box 2009-A, Syracuse, New York 13220**

HELP WANTED

\$180 PER Week Part Time at Home. Webster, America's foremost dictionary company needs home workers to update local mailing lists. All ages, experience unnecessary. Call 1-716-845-5670 Ext. CM.

JOBS OVERSEAS - Big money fast. \$20,000 to \$50,000 plus per year. Call 716-842-6000 ext. 149B

EMPLOYMENT INFORMATION

ROCKY MOUNTAIN EMPLOYMENT NEWSLETTER!! Colorado, Idaho, Montana, Wyoming! Current openings - all occupations! **FREE** details . . . Intermountain-M, 3506 Birch, Cheyenne, WY 82001.

JOBS OVERSEAS . . . (Including Alaska). Free Details. Global Employment, Box 808-MI, National City, California 92050

OVERSEAS EMPLOYMENT . . . \$20,000 - \$60,000 +. Free Report! Employment International, Box 29217-CE, Indianapolis, Indiana 46229.

SUNBELT EMPLOYMENT Trades, Professional/Management, Sales, Clerical, General. Each list of 300 jobs, \$4.00. Rockwell, 221 Shoemith, Haslett, MI 48840

\$600/WEEK. Inland oil exploration crews. Male/female. vigorous. SASE. Details, Job Data, Box 72MI, Fayetteville, AR 72701.

MISSISSIPPI RIVERBOATS. Plenty of jobs available. Above average income. Free room and board. For information, send \$6.00 with stamped self-addressed envelope to: Riverboat, Dept D, P.O. Box 1168, Dickinson, Texas 77539

OILFIELD JOBS 177 Companies, List \$5.00. FCH-MII Rt 1 Box 53, Creole, Louisiana 70632

FOR SALE, MISC.

MEXICAN LEATHER CATALOG \$1.00 Refundable. McGrote, 27200 Pinehill's, Canyon Country, CA 91351

WANTED TO BUY

SCRAP SILVER ELECTRICAL CONTACTS, Forklift Contacts, Industrial Scrap Silver, Sterling Silver Solder, Gold Plate. Send Sample For My Offer. All Samples Returned. R. Leszczak, 652 Myrtle St., Elizabeth, N.J. 07202 (201) 353-5049

BUYING TUNGSTEN CARBIDE, Stellite, Gold, Silver, Tantalum top prices. Poley's Salvage - 12389 Minges - Battle Creek, Mich. 43017 - (616) 979-4075

PRINTING PRESSES, RUBBER STAMP OUTFITS

PRINT YOUR OWN—Printing Presses, type, supplies, direct from factory. Send 25¢ for catalog and samples to: Kelsey Co., DI, Meriden, Conn. 06450.

RUBBER STAMP supplies catalog. Jackson, Brownsville Rd., S-120, Mt. Vernon, IL 62864

RUBBER STAMPS

RUBBER STAMPS \$1.50 per line. A.A.A., 2995 Clague Rd, North Olmsted, Ohio 44070

RUBBER STAMP first line \$2.50, additional lines \$1.00 each, Portage Stamps, 2433 Ridgefield, Portage, MI. 49002

WELDING, PLATING, SOLDERING

WELDING ALUMINUM made easy with The LUMIWELD Process. For details Send S.A.S.E. to Dept. 12, Alumsmiths, Inc., P.O. Box 517, DeLand, FL. 32720

WELDING MADE easy! Learn the tricks. Manual \$6.95. Leaf, P.O. Box 10156, Colorado Springs, Colo. 80932

INVENTIONS WANTED

INVENTIONS WANTED by Manufacturers. George Spector. **MANUFACTURERS REPRESENTATIVE**, Woolworth Building, New York 10007.

IDEAS, INVENTIONS. New Products, needed by innovative manufacturers. Marketing assistance available to individuals, tinkers, universities, companies with feasible concepts. Write for Kit-MI, IMI, 701 Smithfield, Pittsburgh, PA 15222.

INVENTIONS WANTED FREE CONSULTATION NO IDEA TOO SMALL Disclosure registration. Potential cash or royalties from manufacturers seeking new ideas. For free information on how to register your ideas, call or write: **AMERICAN INVENTORS CORPORATION** 59 Interstate Dr. Dept. MI West Springfield, MA 01089 (413)737-5376 A Fee Based Marketing Company

INVENTORS: FREE information on offering your invention for sale. Kessler Sales Corporation, C-65-IW, Fremont, Ohio 43420

FOR INVENTORS

PATENT YOUR Invention Yourself! Inexpensively! Retired Examiner, 7400-MI, Washington, D.C. 20044

U.S. PATENT Office Searches, 234 Broadway, Room 3615, New York, 10007. Free Invention Certificates.

INVENTORS — UNITED STATES PATENT SEARCHES, PATENT DEVELOPMENT, MARKETING of inventions — ideas. **MANUFACTURERS CONTACTS. FREE INVENTION CERTIFICATES**—Invention Information. Serving Inventors since 1948. **GEORGE SPECTOR**, Licensed Engineer—**PATENT ENGINEER**, Former **UNITED STATES PATENT OFFICE EXAMINER**—3615 Woolworth Building, New York 10007.

NONPROFIT FOUNDATION helps inventors. Widest range of services. Free recording forms. Free evaluation. Affiliated Inventors Foundation, 501-C Iowa, Colo Spgs. CO 80909.

REGISTERED PATENT ATTORNEY. Applications and Searches. Mail Service. **FREE PRELIMINARY REVIEW OF YOUR DISCLOSURE.** Box 392MI Millwood, New York 10546

HOW INVENTORS really make money. Starting report. \$2. Box 249MI, Bellvue, Colorado 80512.

INVENTORS: IF you have an invention for sale or license, write for free booklet explaining how we can help you. Kessler Sales Corp., C-65-FI, Fremont, Ohio 43420

PATENT IT ECONOMICALLY! Free details. N. Rainer, 2008 Fondulac, Richmond, VA 23229.

INVENTORS THE American Patent Law Association, a national lawyers association, offers a book and, if you choose, half hour consultation with a qualified attorney concerning the protection and commercialization of your ideas. Send \$15, check or money order, to APLA, Box B, 2001 Jefferson Davis Highway, Arlington, Virginia 22202.

REAL ESTATE, FARM LANDS

BIG . . . NEW . . . Free . . . Summer Catalog! Over 2,800 top values coast to coast! **UNITED FARM AGENCY**, 612-AA West 47th, Kansas City, Mo. 64112.

LIQUIDATING FLORIDA land 75' X 125' Lots for homes or mobile homes. Lake Weir access, Ocala area. \$5,995 0 Down \$59. Month. Phone free 1-800-521-4996 or write MX.Land, 1424 NW First Ave., Ocala, FL 32670

NEW! FREE! Big Summer Catalog! Over 5,400 country properties described, pictured! Land, Farms, Homes, Businesses, Recreation, Retirement buys! Selected best thruout the U.S. Over 700 offices, 43 states All Across America! Yours **FREE** from the World's Largest! **STROUT REALTY, Inc.**, 7 S. Dearborn, Dept. 5480, Chicago, IL 60603.

AFFORDABLE HOUSING even with today's inflation and interest rates! Free Details. Andersen, Box 9866 Brookpark, Ohio 44142

FLOWERS, PLANTS & NURSERY SUPPLIES

KNEE PADS. Eliminate sore, aching, Stiff Knees, Soft Rubber. \$3.98, 50¢ shipping. Sutton's, M22 Canyon, Sandia Park, New Mexico 87047

FARM & GARDEN EQUIPMENT

SAVE 80% on weeding and hoeing by using **DEAN FOSTER'S** Wiggle Hoe. Send for Free brochure. Dean Foster Nurseries Dept. MI-wc, Hartford, MI 49057

WEARING APPAREL

MEN'S BIG & TALL western apparel and outerwear color catalog. Send 25 cents to Big Guy Western 3095 Kerner Blvd., San Rafael, CA 94901.

TREASURE FINDERS METAL DETECTORS

FIND OLD coins, jewelry, gold nuggets. New patented revolutionary device. Free catalogue. Gardiner, 4729BB N. 7th Ave., Phoenix, AZ 85013.

TREASURE - LOCATE quarter mile away with ultrasensitive locator - brochure free. Research Products, Box 270270-NC, Tampa, Florida 33688

OLD GOLD WANTED

HIGHEST CASH IMMEDIATELY For Old Gold, Silver, Platinum, Jewelry, Gold Teeth, Watches, Diamonds, Spectacles, Free Information. Rose Industries, 29-K East Madison, Chicago 60602. Established 1934

HIGHEST CASH for Gold, Jewelry, Gold Teeth, Rings, Diamonds, Watches, Silver, Platinum. Mail Articles Today. Free gift with Information. Chicago Gold & Precious Metals, 6 E. Monroe, Dept. 956, Chicago, 60603.

WATCHES, WATCHMAKING, CLOCKS

CLOCK AND Watch repairing books, tools, materials. Free catalog. North American, Box 77-CE, Fox River Grove, Illinois 60021.

JEWELRY

BELT BUCKLES for coins or stones, specialty buckles, jewelry mountings, cut stones, rockhound supplies. Wholesale catalog, 25¢ Eloixite Products 10th Street, Wheatland, Wyoming 82201

GET FREE Catalog no serious rockhound, gem cutter, jewelry maker, hobbyist or craftsman can be without. Full of bargains, exclusive items, low prices from largest suppliers and authorities in the field. Free . . . new catalog just off the press, yours for the asking! Write Grieger's Dept. C-3, 900 S. Arroyo Pkwy., Pasadena, California 91109.

PERSONAL

BECOME AN Ordained Minister. Free Ministerial Credentials legalize your right to the title "Reverend." Write Church of Gospel Ministry, 486-MX Skyhill Court, Chula Vista, California 92010.

ADVANCED TITLES/DEGREES Ministers, Honorary Doctorates, other services. Omnidenominational. Free details. Aquarian Church, 432-MI PCH, Hermosa Beach, California 90254

UNIVERSITY DEGREES BY MAIL! Bachelors, Masters, Ph.D.s . . . Free revealing details. Counseling, Box 389-IM5, Tustin, California 92680.

"BIORHYTHM FORECAST", physical, emotional, intellectual cycles for 6 mos. 7-page forecast calculated for each person based on birthdate. Computer converts printout to words for instant interpretation. For each order send \$11.00, large SASE, person's full name, birthdate to DUX Enterprises, PO Box 418, Fair Oaks, CA 95628.

NUTRIENT DEFICIENCY TESTING by licensed Chiropractor, completing Ph.D. degree in nutrition, using computer processing. **PERSONAL EVALUATION** Vitamins, Protein, enzymes and Minerals based on answers to scientific questionnaire. Information \$1 (refundable). Dr. Joseph Waddell, 305 Southwest, Bainbridge, Ga. 31717

CONFIDENTIAL CHICAGO MAILING ADDRESS: Business, Personal, Since 1944! Mail Center, 323(u) Franklin, Chicago, 60606

LOANS BY MAIL

BORROW \$25,000 INTEREST-FREE. Everyone eligible. Details: Executive MX5, Box 996, Dundee, FL 33838

GET CASH grants—from Government. (Never repay.) Also, cash loans available. All ages eligible. Complete information, \$2 (refundable). Surplus Funds-MX, 1629 K St., Washington, D. C. 20006

INTEREST FREE \$800 loan; \$1.00 tells how. Rosenco Printing, Box 1164-M, Scottsdale, AZ 85251

BORROW \$25,000 INTEREST-FREE. Everyone eligible. Details: Executive MX5, Box 996, Dundee, FL 33838

BORROW \$25,000 "OVERNIGHT." Any purpose. Keep indefinitely! Free Report! Success Research, Box 29070-CE, Indianapolis, Indiana 46229.

BORROW FROM HOME Any amount, any worthwhile purpose, within 30 days. Competitive Rates. Also, you can earn substantial income as a Money Agent. No experience - own hours. National Company to assist every way possible. No Gimmicks! Free Details: DFC, Dept. 12-C-5, 1145 Reservoir Avenue, Cranston, Rhode Island 02920

QUICK CASH\$ Signature Loans! Write: Elite, Box 454 - X, Lynbrook New York 11563.

MISCELLANEOUS

LOCATE Gold, Diamonds, Oil. Home Made Device-Plans \$7.00. Ron Mutter-spauha, 1712 1/2 Lake Ave., Panama City, Fla. 32401

WINEMAKING, & OTHER RECIPES

MAKE WINE, beer, liqueurs. Free catalogue. Bacchanalia, Box 51, MI Central Village, Mass. 02790

BEERMAKERS - FINEST equipment, supplies. Lowest prices. Free catalog. **BEEHAR-GEAR**, Box 25093-I, Lansing, Michigan 48909

BEERMAKERS-WINEMAKERS Free catalogue. Yeast, equipment. Continental, Box 68016-MI, Indianapolis, Ind 46268

FREE ENCYCLOPEDIA Winemaking, Beer-making Supplies, Equipment, Ingredients. Vynox, Box C-7498, Rochester, N.Y. 14615

WINEMAKER-BEERMAKERS - Free Catalog - Fast Service - Large Selection: Kraus, Box 7850-T, Independence, Missouri 64053.

BEERMAKING SUPPLIES . . . World's Largest . . . Free Catalogue. Bierhaus, Box 8376-BB, Erie, Pennsylvania 16505

BEERMAKERS! WE'RE Specialists. Free Catalog/Newsletter. William's Brewing, Box 461-X5, Oakland, California 94604

MAKE DELICIOUS CHEESES in your own kitchen. Illustrated **CATALOG**, with **RECIPES**, \$1.00 (Refundable). **CHEESEMAKING BOOK** \$6.95. **NEW ENGLAND CHEESEMAKING SUPPLY COMPANY**, Main Street, Box 0851, Ashfield, MA 01330.

FREE BEERMAKING BOOK plus catalog. Finest equipment, ingredients. Fully guaranteed SPI box 784-I Chapel Hill, NC 27514

SCIENCE & CHEMISTRY

NEW 200 PAGE 1981-82 catalog, listing thousands of chemicals, science equipment and labware. Send \$2.00 to Merrell Scientific, Dept. MX, 1665 Buffalo Road, Rochester, New York 12624.

CHEMICALS, APPARATUS, project books, wide selection, catalog \$1.00 send to: Pioneer Ind. Co. 14a Hughey Street, Nashua, N.H. 03060.

FORMULAS, PLANS, ETC.

20,000 MONEYMAKING FORMULAS! CATALOG - \$2.00 - REFUNDABLE! GWA8, Box 193, Brookfield, WI 53005

REMOVE PLATINUM FROM CATALYTIC CONVERTERS: Complete details \$12.95. Stevil Research, Box 634-M, Sherman Texas 75090

ANY FORMULA \$10.00 Catalog — Treatise \$1.00. Belfort, Box 568, Chicago, 60690

FOR THE HOME

HOW TO operate two side-by-side garage doors using one electric opener. Complete directions. \$5.00 Allen Doors, 1743 Stoner N.E., Massillon, Ohio 44646

HOME REPAIRS, REMODELING

SHEETROCKING MADE Easy - Complete Instructions. Send \$4.00 to B & B Enterprises, Box 571, Liberal, Kansas 67901

NUTS

By Bill Kilpatrick



It's probably too early in the Reagan years to pass this along to the new Administration, but we think we may have a handle on the energy crisis. Well, not the *entire* energy crisis, but a significant chunk of it, anyway.

What we've faced up to and surmounted is the pressing problem of personal transportation. We've learned to cope with, if not thwart, spiraling gasoline prices, and we think maybe the new Administration isn't ready to hear about it because adopting our scheme tends to cause, even demand, radical change. Every schoolboy can tell you that anything radical in Washington these days is outsville, especially change that smacks of the story of Dr. Jekyll and Mr. Hyde.

What we've done, you see, is motorize our bicycle, as a result of which whole new worlds have opened to us. We're a different person. We have a new personality, a new outlook, a distinctive way of dressing, an entirely new and colorful (blue) way of expressing ourself.

Triggering this metamorphosis was an ad in a magazine, its illustration showing what appeared to be the rear wheel of an ordinary bicycle over which—and in back of and below the level of the seat—was mounted what looked like a motor for a small chain saw, or maybe one of those plastic string whirlers used to cut weeds and trim around trees, fences and garden beds. "Put the sting on gas prices!" read the ad in bold black type. "Get

200 miles per gallon with a Bumble-Bike Motor on your bike."

The very day we saw that ad three of the oil industry's infamous Seven Sisters announced a two- to three-cent-per-gallon boost in the price of gasoline, so the message leaped right off the page. The ad went on to say we could "zip around at 20 mph and climb hills easily" with what it claimed was one of the "smallest, lightest, fastest"

bulge, and maybe it was. But once passed the age of about 15, pedaling a bicycle any distance over a mile—particularly on a 90-plus degree day—became uphill all the way, even on a multi-speed and even on level going. So, bulge or no bulge, we'd been poking around here and there in bicycle shops and in places like Sears to find what to us looked like a suitable means of getting ourself motorized.



bicycle engines ever made. Installation was a promised breeze and satisfaction was guaranteed. To learn more, all we had to do was "write to Bumble-Bike, P.O. Box 1116, Havana, Florida 32333."

Well, now, we said to ourself, maybe this is the rig we've been looking for.

We have this bicycle, see, and we rode it back and forth to the office on the theory it was an ally in our personal battle of the

All we could find were variations on a Japanese-made front-wheel-drive theme, an idea that for some reason didn't appeal to us, probably because we felt it might be not only a bit of a chore to steer and control in semi-panic situations, but also because it looked too heavy, meaning possible balance problems and—in all likelihood—undue tire wear. Our feeling was one you can't really explain; obviously the setup

works (we're told they're selling like hotcakes), but we wouldn't be convinced even if you showed us, an attitude that probably explains the collapse of Western civilization or at least the Philadelphia Eagles.

We also came across an electric motor for a bicycle, but, truly, it doesn't lend itself to mounting on a two-wheeler. It's really for an adult tricycle and we aren't as yet old enough for trike-ridership. The electric setup was pretty heavy, too.

Anyhow, we clipped out the ad for the Bumble-Bike motor and wrote asking for details. We received in reply two four-page printed letters not unlike those you receive urging you to subscribe to a magazine. One letter was devoted to the motor itself, the other to the 42-pound folding and motorized two-wheeler we were assured was "great for boaters, pilots, campers, apartment-dwellers and students," and which could be stowed easily in the trunk of our car.

We read both letters eagerly, reluctantly deciding that the folding bike—while something for which in an earlier time we might have sacked the coast of Northumbria—was, at about \$330, a bit rich for us. Besides, we already had a bike, so we went back to and lingered over the other letter. We were a pushover.

"Picture yourself having the time of your life as you buzz along at over 20 mph . . . climb hills with ease . . . and pass by gas stations with just a wave" read the copy. "You can zip around for up to two

(Turn back to page 16)



THE NEW TOYOTA DIESEL TRUCK.

We took a tough Toyota Truck and made it even tougher by putting a Diesel engine in. Is that going too far? We don't think so. We say the new Toyota Diesel Truck is what a Diesel should be.

Take mileage. 38 EPA Estimated Highway MPG, 31 EPA Estimated MPG is higher than any gasoline-powered truck!*

But this Diesel is more than just economical. Our obsessive attention to detail has paid off by reducing engine noise, for quieter operation.

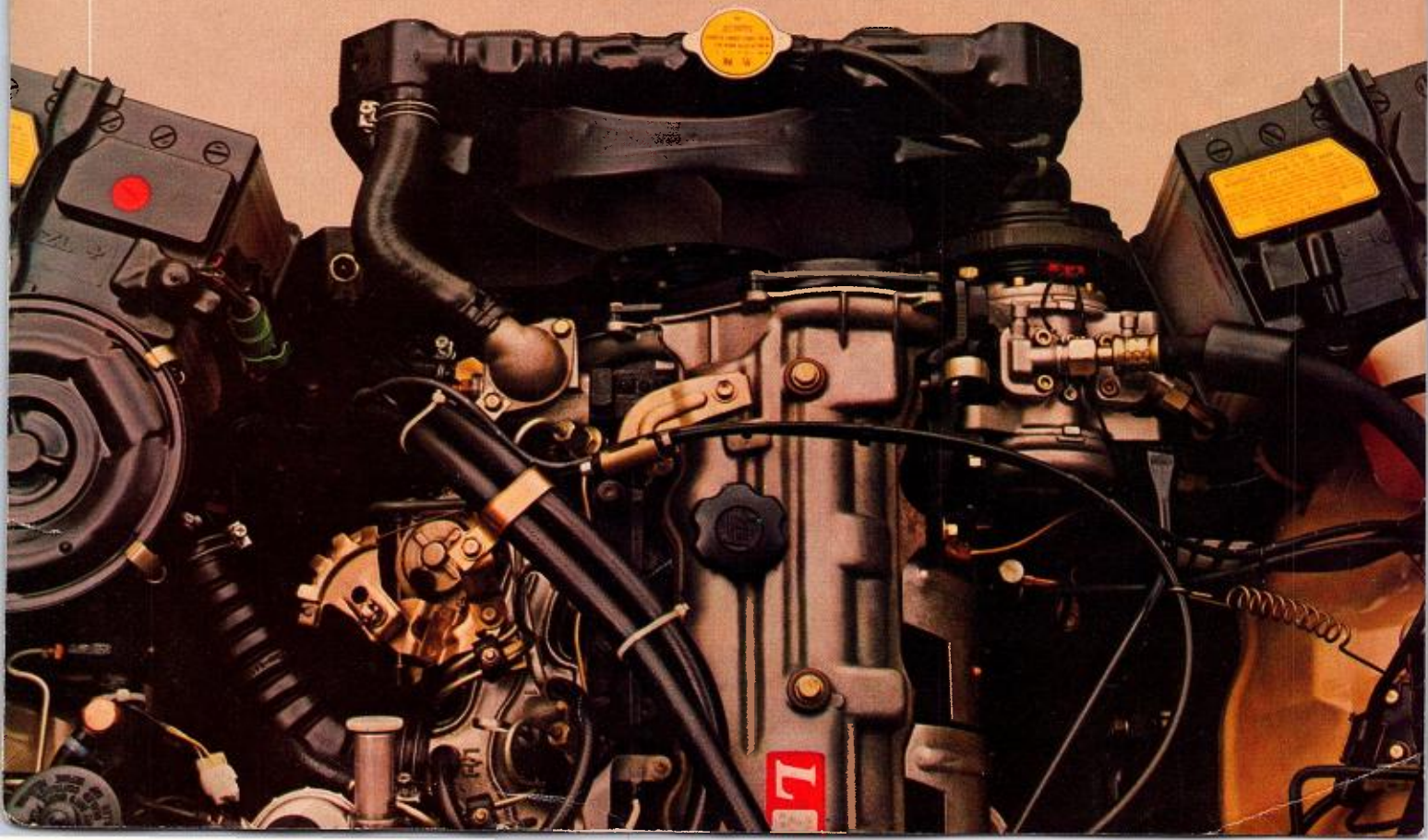
Equipment? We believe a Diesel should be equipped only one way. The right way. With features like a 5-speed overdrive transmission standard, not optional. A 7-foot cargo bed, not 6-foot like some. And a separate, rugged frame (like an 18-wheeler has)

so Toyota's Diesel Truck carries a full 1000 pounds of payload. Inside, the interior is what every truck should be—comfortable.

Drive one of these tough new trucks. You'll find that what your Diesel should be... is a Toyota!

*Remember, use this EPA Estimated MPG for comparisons of other trucks with manual transmission. Your actual mileage may vary, depending on how fast you drive, weather conditions, and trip length. Actual highway mileage will probably be less than the EPA "Highway Estimate."

INTRODUCING THE TOYOTA OF DIESELS.



Take the road to flavor
in a low tar cigarette.



The low 'tar' with
genuine tobacco flavor.

RALEIGH LIGHTS



Warning: The Surgeon General Has Determined
That Cigarette Smoking Is Dangerous to Your Health.

9 mg. "tar", 0.8 mg. nicotine av. per cigarette, FTC Report Jan. '80.